American Railroad Journal.

WHOLE NO. 2,568.] NEW YORK, SEPTEMBER, 1885. [VOLUME LIX.—No. 6.

ACCIDENTS FROM BROKEN RAILS AND WHEELS.

BY WM. S. HUNTINGTON.

[Written for the AMERICAN RAILROAD JOURNAL.]

WHEN a rail breaks the results are usually of a serious nature, and as derailments from this cause are on the increase, it should receive attention from railway officials. Not that it is possible to procure rails that will never break, but it is believed that greater care in their selection and better treatment while in service will reduce breakages to a notable degree. But it is an error to suppose that to increase the weight of rails adds to their strength, unless due regard is paid to the quality of the material and the manner in which it is distributed, *i. e.*, the rail-section. Roads that have recently undergone renewals of rails of greater weight than those that were removed are regarded as safer from breakages of rails than before the change; but this is only true when conditions other than the weight of rails have been considered. If there is no greater tie-support and the traffic has increased and heavier rolling-stock is used, breakages will continue to be as frequent as before the changes.

Some who have sought to improve the quality of rails have hardened them to resist the rolling friction to which they were subjected. In doing this they have reduced their vertical and lateral strength so that while they have been improved in the direction of *wear*, their *strength* has been impaired and breakages increase; and an 80-lb. rail of inferior goods is not as safe as a much lighter one of good material, and is fashioned with a view to strength rather than wearing qualities. But engineers will continue to purchase and use heavy rails that will carry millions of tons without wearing out, *if they do not break*, and some prominent men of that profession propose, as a measure of economy, to increase the weight of rails and reduce the tie-support. They argue that with the present low price of steel and the high price and growing scarcity of ties, the weight of rails and the distance between ties may be increased almost indefinitely. In the distant future, when ties are very, very scarce, and we can afford an abundance of very good frost-proof ballast and steel ties, we may place them very far apart and surmount them with very heavy and safe rails; but for the present, with a liberal supply of good wood ties and a fair supply of gravel or rock-ballast and an honest rail of moderate weight and properly cared for, we can make an accident from a broken rail a rare occurence.

The question is often asked: "Why do rails break?" and the usual explanation follows that there is now and then a bad rail in any good lot, which is all very true; but most good rails do not break from an inherent weakness in them, but from ill treatment. A rail of rather inferior quality may, if well cared for, serve a long time—wear out in fact—without breaking; but it must be uniformly supported at all times, for even a good rail will soon break if the deflection is uneven, and it should be the aim of all who are in charge of laying or repairing track to make the rail-support uniform throughout its entire length. This is easily done by spacing the ties properly and giving careful attention to joint-fastenings. Many rails break at or near the ends of the fish-bars by being gripped too tightly and not lying properly on the ties, so that the combined support of the ties at or near the joint, and the joint-fastening, will not admit of as much depression at that point as in other parts of the rail, and it operates as a fulcrum and point of fracture. Thorough drainage will prevent rails from breaking to a great degree, especially in severe cold, by preventing the action of frost, or heaving of the ballast or road-bed.

Attention to the foregoing precautions will reduce the number of broken rails, and a more efficient rail-fastening will, in many cases, prevent derailment from broken rails. Trains frequently pass over broken rails without damage or derailment, but with a better system of fastening, the broken rails would not be thrown out of place and there would be no damage other than the loss of the rail.

Trackmen who have the care of heavy rails are liable to place too much confidence in their strength and safety, and do not give proper attention to what they consider minor details of repairs, and breaks occur when least expected. The best rails need close watching and good treatment to insure safety, and these facts should never be lost sight of by railway managers or employés.

Wheels, like rails, do not always break because they are of poor quality, but good wheels frequently fail from rough usage; and the first move that is suggested to prevent breakage of wheels is greater care in their selection, and the first move of all is to select the makers, for, be it known, some establishments make a specialty of turning out wheels of such inferior quality that some roads have rejected them and will not even accept them as repairs from foreign roads.

As there is no remedy for the frequent breakage of poor wheels—or rather cheap wheels—but to discard them entirely, no suggestions need be offered here other than to point out some of the causes of breakage of good wheels. Frogs and guard-rails may be charged with more broken wheels than anything else with which they come in contact. Well-made frogs when properly placed and kept in good repair are not particularly destructive to wheels, but some trackmen have very queer notions about laying frogs, and wheels suffer in consequence. Some lay the frog wide-gauge at the point, for reasons that they cannot explain, while others contract the gauge at the point for some mysterious purpose not yet made public. These mischievous practices bring the wheel-flanges in contact with either the wing or throat of the frog on one

side, or the guard-rail opposite, with powerful shocks that are liable to break a wheel at any time, but are sure to loosen the frog and guard-rail, and it is only a question of time before this nonsensical practice will cause a general wreck at any given point. When it is noticed that a wing, point or throat of a frog or a guard-rail is being hacked and gouged by wheel-flanges the cause should be sought and the remedy applied at once; and investigation will show that the track is too wide or too narrow, or that the guard-rail is not the right distance from the gauge-line or point measured from as the gauge side of the track, or that the point of the frog is not the right distance from the head of the switch. Every one of these defects is destructive to wheels, and a frog that is loose or pounded badly, or a loose guard-rail, are elements of danger that should receive immediate attention. Some of these defects are destructive to flanges while others chip the tread, and however slightly the wheel may be injured of itself it may cause a serious disaster, and the old adage of "a stitch in time" should be kept in mind and applied to frogs as to all other track repairs.

It frequently happens that trucks are out of square and wheel-flanges on such trucks will cut frogs, etc., as mentioned above. This is no evidence of defect in track or fixtures and when it is the exception, rather than the rule, no notice need be taken of it by trackmen except to call the attention of trainmen to it when the truck may be traced out and repaired. And here it may be said that "trucks out of square" is by far a too frequent cause of broken wheels and derailment without broken wheels.

Another cause of breakage of wheels is ver open joints in the rails. This can be remedied by means well-known to trackmen. At switches a certain amount of space is necessary (an inch is sufficient, but frequently several inches of space may be found at switches) for the free movement of the switch rails, but no unnecessary space should be allowed between rails as it is destructive to both wheels and rails.

Crossings are also destructive to wheels, but as there is as yet no satisfactory remedy known for this evil no further mention will be made of it here. It is a waste of time to call the attention of the readers of the JOURNAL to the causes of non-preventable accidents (or the non-preventable causes of them), and only such causes as may be successfully counteracted will receive attention.

As before remarked the first consideration is to procure good rails and wheels, but it is of prime importance that the apparently trifling details of repairs mentioned herein receive prompt attention at all times. The relations of rails to wheels are such that a proper treatment of the former has a beneficial effect on the latter, and managing officials will do well to bear in mind that it is close attention to details that renders perfection possible, and that many of the causes of accidents from broken rails and wheels are wholly inexcusable or entirely under their control, and that lack of attention to them is nothing short of criminal neglect. The published records of derailments for nine years from broken rails give the number as 529; and from broken wheels, 237. All of these derailments were serious in their effects and nearly all resulted from preventable causes that were within easy reach of officials and employés.

"TWO INTO ONE—NO TIMES."

BY EDGAR C. DAYTON.

[Written for the AMERICAN RAILROAD JOURNAL.]

"Two into one—no times, with nothing over." It is difficult to get away from this bald fact, and it is equally difficult to get away from the fact that two railways cannot come into direct competition with profit where the amount of business is barely enough for one road. The two propositions are precisely similar, yet strange to say, shrewd financiers either cannot or will not see it.

The dreary history of our railways for the past three years shows that something is radically wrong. It is a continuous record of throat-cutting and insolvency. Each road is watching its rivals, anxious to prevent their reaping profits, and ready to plunge into direct competition at the slightest indication of another line operating to advantage. And this competion, which is called the life of trade, is death to railways.

The peculiar part of it all is that competition is entered into without, apparently, the slightest hope of financial profit. A road may be operating between two points and it may show earnings between these points. The amount of business may be fairly large, but not excessive, and profit results simply because the road has a practical monopoly between these points. The road can readily manage the entire traffic and can manage it at a fair profit; but the construction of a parallel road means simply starvation for both. Assuming that such a competing line is built, it naturally follows that each line gets a share of the traffic, and the rates are, of course, slaughtered in the hopes of getting the lion's share. The profits vanish. It is simply a case of "two into one—no times, with nothing over." And yet in the face of this inevitable result there is scarcely an instance where a road has been allowed to reap the advantages of a reasonable monopoly. A rival line is constructed in the full knowledge that it can only be operated at a loss, and there is a dog-in-the-mangerishness about this feature of railway competition that is truly painful.

It is not surprising that the form of competition known as "paralleling" has come to carry with it a grave significance in railway diction, and that our legislatures are directing their attention to its restriction. The difficulty is to restrict railway competition without fostering monopoly, and this is a difficuly with which legislators will have to struggle for years before they can successfully accomplish any results. For some reason or other there is a fascination in railway investment that to a great extent blinds the judgment of investors. Again, it is evident that railways offer one of the few forms of investment where large amounts of capital can at once be invested. Again, apparently, the impression obtains that it is a profitable form of investment. Such it may be under reasonable conditions of prosperity, but the history of railway investment for the past few years gives anything but a profitable showing.

About the best thing that could happen at present would be the growth of a general disbelief in the profit of railway investment. If our capitalists would only believe that there was no security in railway investment, that it was dangerously speculative, that they could invest their capital elsewhere to better advantage, and if they would only stick to this belief for half-a-dozen years, the railway

world would be the gainer. The only cure for the evils of over-production is a period of absolute cessation, and it would seem that there has been an over-production in railway construction. Railways are supposed to grow up to the towns. That is the true principle and the only one whose practice results in profit. Unfortunately, of late the towns are expected to grow up to the railways, and they have not grown fast enough. It is, perhaps, going pretty far to say that railway construction should cease entirely for five or six years, but if such an absolute cessation should take place there can be little doubt that the roads would be in better shape at the expiration of that time than they are now; and to avert the evils of ruinous competition brought about by reckless railway construction, the very simple suggestion is made to "quit it." We have pretty nearly reached hard pan now, and a little wisdom may be gained by reflecting upon that simple truth, "two into one—no times, with nothing over."

SOUTHERN RAILWAYS DURING THE REBELLION.

BY WILLIAM S. VEST.

[Written for the AMERICAN RAILROAD JOURNAL.]

DURING the late war of secession, the railways in most of the southern states occupied a secondary position owing to the wonderful water facilities afforded to the invading forces of the Union. The Mississippi river—that "inland sea" as Mr. Calhoun appropriately styled it—with its numerous tributaries, afforded safe and easy transit to the very heart of the Confederacy. Steam gunboats and transports rapidly conveyed large armies and their necessary supplies to most points of strategic importance. Gunboats in the York river guarded the right flank of McClellan, when marching up the peninsula, and by that stream all of his supplies were brought within a few miles of Richmond. All supplies required by Grant's army reached City Point by water, not an hour's ride from the beleaguered city of Petersburg. When reverses occurred the gunboats were arks of safety while pursued by a victorious enemy. Such they proved to be to the demoralized army of Grant, while cowering under the protection of their guns at Pittsburgh landing, and none the less so to the Army of the Potomac when forced to make the memorable "change of base" from the swamps of the Chickahominy to the banks of the James river.

Still, the railways were of great, and in some cases, of decisive importance to both the contending parties during the war. But for them, the first battle of Bull Run would have probably resulted in a victory for McDowell's troops. Without their aid his army would not have found Stonewall Jackson and his command opposed to it; nor would the first attacks of Grant's army in Petersburg have been unsuccessful, but for the arrival of trains—not an hour too soon—freighted with troops, hurriedly despatched from the distant coasts of Carolina and Georgia.

The most signal instance by far of the value of railways to an invading army is afforded by Sherman's Atlantic campaign. By single-track roads abounding in many wooden bridges and extending to Nashville, 300 miles distant, an army of over 100,000 men, and 35,000 horses and mules were amply provided, month after month, with all necessary supplies; and during all that time, notwithstanding many attempts were made to break the line of communication, they were attended with such trifling success, that all damage inflicted was easily and readily repaired. The astute commander of the Confederate forces repeatedly urged upon his government the vital importance of permanently disabling the roads, and advised that General Forrest with 5,000 cavalry should be assigned to that duty; but from the ill-feeling existing between the authorities at Richmond and Gen. Johnstone, the repeated appeals of the latter seem to have been utterly disregarded. In striking contrast to the wonderful energy displayed on this occasion by the Union quartermaster and commissaries at Nashville, was the glaring inefficiency of similar departments on the Confederate side. Lee's army, that of Northern Virginia, was suffering from short rations during the last two years of the war, and this evil rapidly increased as the end drew near. Long before Petersburg was evacuated it was greatly weakened by desertion. Thousands of the men composing it, undismayed by the shot and shell of the enemy, were not proof against the pangs of hunger. That there was no actual scarcity of provisions for the troops was amply proved after the Appomattox surrender. Many thousands of rations with other supplies stored along the line of railways in North Carolina after this event were destroyed by order of the Confederate authorities. That they never reached the hungry soldiers at Petersburg was simply owing to the notorious inefficieny of the men at the head of the quartermaster's and commissary departments. Many urgent demands were made for their removal, to which the President of the Confederacy paid not the slightest attention, apparently for the reason—if reason it was—that all such demands were direct personal insults to himself. This strange perversity was the cause of great disasters to the Confederacy. The fall of Vicksburg is by many considered mainy attributable to it.

The railways in the southern states suffered greatly during the war. Many of them were destroyed before it ended, and those which survived its ravages were in such wretched order that continual accidents and delays were frequent. When it is remembered that for four years no new rails or locomotives were furnished them, the wonder is that they performed so well the hard duty required of them by the government.

Passenger-coaches were first used for transporting troops, but these proving not nearly numerous enough the ordinary box freight-cars took their place. Many of them were in a filthy condition, infested with vermin and affording no protection from the rain, for their tin roofs were so perforated by holes made in them by bayonets that from a bird's-eye point of view, they looked like gigantic nutmeg-graters. No light was furnished save that from the lanterns of the conductors. A ride under these depressing circumstances, particulary when the sick and wounded were mixed up with the other passengers, was the very reverse of pleasant.

This language is, however, not strong enough to convey a correct idea of the horrors encountered by those compelled to take a long railway journey immediately after the great battles fought in Virginia. The depots then in Richmond were crowded, not only with sick and wounded soldiers, but with women, many of whom had left their distant homes as far off as Louisiana and Texas in search of their husbands reported "missing." Very few were successful in their search, and these poor

creatures, sick from want of sleep, disappointment and proper nourishment, presented a woebegone appearance which excited universal sympathy. Most of them had spent all their money in reaching Richmond, and relied entirely on free passages for their homeward journey—and they were freely granted.

The wounded soldiers were far more disagreeable passengers. Making themselves perfectly at home they crowded around the water-coolers in the cars, wetting their bloodstained bandages every few minutes with the scanty supply of drinking-water provided. They were, as a rule, quite cheerful. Probably the unlooked for pleasure of seeing their homes again, crippled as they were, made them so. When asked to show their furloughs many would hold up their mangled arms and hands in silence, and this mute way of replying seemed perfectly satisfactory. A close observer could not help noticing how many suffered from hands and fingers being amputated. A vague suspicion might naturally arise that these injuries were self-inflicted, but it was not so. They were evidently caused by carelessness—by the guns of the rear rank when formed in line of battle. The front rank extending their hands too far on the barrels of their rifles, had them blown off by the fire of their friends in the rear. Raw troops in their first battles suffer from this cause.

One or two box-cars on the trains carried a still more ghastly freight. They were filled with the dead bodies of officers and privates found upon the field. Most of them were so altered by decomposition that recognition was impossible, and in such cases articles of clothing were mainly relied upon to indentify them; but many mistakes were made and corpses carried hundreds of miles on railways and buried in church-yards by supposed weeping relatives and friends, were in reality those of the unknown dead. Metallic bath-tubs were sometimes used as coffins, and by covering over the top with sheet zinc and soldering them air-tight, these improvised sarcophigi proved very satisfactory—far more so than the pine boxes and saw-dust provided by the quartermaster's department.

The passengers on the trains had to suffer from the scarcity of good meals. Wretched as these meals were—consisting mainly in North Carolina of "cat fish and corn bread"—ten dollars was the price charged and readily obtained for them, the wounded soldiers thus paying a month's wages in the army for a dinner that under ordinary circumstances they would not care to eat. The Confederate Government refused to make its paper currency a legal tender, and it of course rapidly decreased in value. True such action would have been "unconstitutional," but not more so than the "Conscript bill" which was the cause of untold suffering. Mr. Chase was master of the situation when he boldly made greenbacks a substitute for gold and silver, and by doing so safely carried the United States through the financial difficulties of the war.

The railways, all of them in the south, had their largest customer in the government. All were worked to their fullest capacity in carrying troops and military supplies of all kinds, and the amount of currency received for these services was immense. Depreciated as it was in value, it was readily taken in exchange for real estate for the first three years of the war, and many sanguine railway stockholders confidently asserted that the roads were becoming rich by investing in houses and lands, as soon as received, the large sums due them from the government. Plantations and churches even all along the lines, were said to have been greedily bought by them, but these pleasing rumors were without foundation in most cases. It is more probable that the wise presidents and directors invested far more of the surplus funds in "8 per cent. bonds" than in real estate.

The railway employés were by no means as careful in transporting loaded shells, cartridges and gun-powder as they ought to have been. The barrels containing the latter extra hazardous ingredient were all in good condition when they left the arsenals, but the jolting on rough tracks frequently loosened the hoops, causing the heads to fall in. As there was not a cinder-proof car—at least during the latter part of the war—in the whole Confederacy, a spark from a locomotive might cause, on a train loaded with troops, its utter destruction, involving a loss of life even exceeding that caused by the mine fiasco at Petersburg. A knowledge of this fact was not calculated to increase the pleasures of an excursion hundreds of miles in length and performed in filthy cars crowded with troops whose wounds from long neglect were positively offensive. On one occasion two car loads of powder were being transferred from one railway to another and their dangerous condition was made known to the conductor who received them in charge, and who evidently was not deeply impressed with the risk he was encountering; but annoyed by the remonstrances made to him, he placed three cars loaded with prisoners next to those containing the powder, assuring his passengers in the rear of the train that they were in "but little danger." Passengers, powder and prisoners made the trip safely, and it is but right to mention that the latter were ignorant of their close proximity for hours to a leaky magazine.

Altogether the history of southern railways during the war of secession is a picturesque one, and more of interest could have been written on the subject than has yet appeared. The picture is not a pleasant one to contemplate, however, especially when the dreary condition of the roads at the end of the war is considered; but the comforting fact remains that the injury wrought southern roads by the conflict of years is rapidly disappearing. The revival of industry in the south has brought about wonderful improvements in its railway facilities, and of the effects of the war upon railways in that territory scarcely a trace now remains.

HOW NEW RAILWAYS ARE INAUGURATED IN ENGLAND.

RAILWAY legislation in England is and has been a long and tedious process, being almost as formidable a proceeding now as when Stepenson endeavored to convince less far seeing minds of the utility and advantages of railways over which people would be conveyed at the furious speed of ten or even fifteen miles an hour. The country already has a complete system of main lines, and these are naturally cautious of interference with each other's territory, and it is therefore by private parties principally that new lines are now promoted. Taken as a whole the proceedings are fair and impartial, politics do

not enter into the question at all, and the strong opposition from existing roads interfered with, competing schemes, landowners, and other interested parties, usually succeeds in bringing out the weak and faulty points in any project, while Parliament is, as a rule, averse to authorizing a line, the necessity for which, as well as whose good faith, is not fully sustained under the ordeal. It is practically useless to put dead-heads as directors in the bill, to make out a cooked estimate or bogus financial statements, or to make similar attempts to bolster up a lame scheme, since the engineers, lawyers and others of the opposition thrash the whole affair out as to the necessity, competition, operation, cost and other matters in detail, and then parade before the committee anything disadvantageous which they may discover; so that at the present time engineers and others have to tax their energies to the utmost in order to obtain the necessary act for their project; a natural consequence of which is that the leading men in the engineering and legal profession are much sought after by promoters, and both parties—but especially the latter—make, as a rule, a very good thing out of their parliamentary practice.

England is now so well provided with iron roads that the construction of trunk-lines is almost a thing of the past, and the majority of new lines which are now promoted are extensions and branches to shorten through routes, to afford additional accommodation, or to tap the more rural districts. Owing to the vast network of existing lines which spreads over the length and breadth of the country, it is almost impossible to lay out a line which does not interfere in any way with some railway or other, and this interference becomes an important item in the consideration of the route to be adopted, so as to avoid any unneccessary crossing or competition, as existing lines are very sensitive and will make a bitter opposition to any scheme which proposes to alter their levels or works in the slightest degree, while such opposition from existing companies is so powerful that it is wise to avoid it whereever possible. This consideration, therefore, and the requirements of local landowners, fixes in a great measure the general route of the line, while the ordnance maps are so complete and extensive, and bear so much information, that with their aid and an inspection of the general route of the proposed road, the engineer can usually determine the center line pretty definitely, so that little or no preliminary surveying or location is necessary, except in the case of long and important lines; many minor lines are laid out for parliamentary purposes entirely by the ordnance maps. When the center line is approved by the promoters, it is laid down on an ordnance map of the 6 inches, or 25.344 inches to one mile scale, together with the "limits of deviation." These are imaginary lines parallel to the center-line and usually 100 yards on each side of it, but are contracted, however, through towns, and sometimes also to avoid cutting into valuable property which would result in opposition from the owners, etc. The legal distance for such limits is 100 yards on each side of the center line in open country, and 10 yards on each side in towns; the distance is, however, occasionally put at more than 100 yards, but in such cases they are not properly limits of deviation, since the center line cannot be moved beyond the prescribed limits. This proceeding, however, has the effect of obtaining powers of compulsory purchase over the land and is therefore resorted to when extra ground is required for stations or other purposes. Trial levels are now taken over rough or bad ground, so that several sections may be plotted, and the most suitable position adopted for the center line.

The map, or a mounted tracing of it, is now taken into the field and corrected, new houses, roads, etc., surveyed in, and all other alterations made within the limits of deviation, errors beyond these limits being of no consequence, and in fact very little is shown beyond them; fences, etc., are, however, continued just beyond them to show their continuity. The scale of the plan must not be less than 4 inches to 1 mile, and if less than 400 feet to 1 inch, an enlarged plan on that scale, or a larger, must be given of every building, court-yard and premises situated within the "limits." In Scotland and Ireland, and for some unimportant lines in England, the 6 inches to 1 mile scale is adopted, but for the majority of lines the usual scale is the large ordnance of 25.344 inches to 1 mile, while for lines in the city of London, the 5 feet to a mile ordnance scale is principally used. Everything of a permanent character has to be shown, even down to ash-bins and foul-runs, if built into the ground; therefore, for a line running through any considerable amount of buildings the 25-inch scale (as it is usually termed) is by no means too large. When the plan is completed, correct tracings are made in lengths of about two feet, usually about a mile on a sheet, with a cut line at each end to show how it connects to the next sheet, the center line is marked by a thick black line with every furlong and mile numbered, the beginning and termination of curves marked, and their radii stated where less than a mile, and the names of counties, parishes and townships, etc., written on. The levels are then taken along the line, and cross-sections of all roads or railways which are to be interfered with have to be shown for 200 yards on each side of the center line. The section is plotted to the same horizontal scale as the plan, and for the 25-inch map has usually a vertical scale of 40, 50, or 60 feet to the inch. This section is divided up into the same lengths as the plan, and is generally printed on the same sheet, the plan above, and section below, with cross-sections between, which is a very convenient arrangement for reference. On the section the level of top of rails is shown by a thick black line, a datum is given at a certain depth below a stated bench mark, furlongs and miles are marked, the height at each end of every gradient and the inclination of the same is shown, the greatest depth of every cutting and height of every embankment is also marked, as well as the vertical distance from rail to surface at any road, river, canal or railway crossed by the proposed line, and the height and span of the arch at such points must also be stated. Tunnels are marked on the plan by a dotted line, and on the section are shown the intended height, and the length in yards is stated. Viaducts are also shown on the section. Where a junction is to be made with an existing line of railway, a plan and section of such line must be given for a distance of 800 yards on each side of the point of junction. Cross-sections are only required of roads whose levels are to be altered, and the amount of alteration must be stated, the inclination of present and altered approaches being also shown on the cross-section.

The plans are now lithographed, forming a book with pages about 30 inches by 18 inches, which are called the "deposited plans" from the fact of their being deposited

in the office of the houses of Parliament. Each house, road, field and other property is given a number on the plans, and a book is prepared, called the "book of reference," giving the number, description, owner, occupant and lessee of such property. Besides the deposited plans and book of reference, an estimate of the cost has to be prepared to a standard form, and, in certain copies of the deposited plans, an ordnance map of the 1 inch to a mile scale with the proposed line marked on in red must be bound up; these copies are for the clerks of the Parliament. Copies of the plans and reference book must be deposited on or before November 30th, and the estimate on or before December 31st, with the clerks of both houses of Parliament, and the clerk of each county in which the line is situated. Each parish clerk also has a copy of so much of the plans and reference book as affects his parish,and other copies have to be deposited with certain other parties, and in most cases the important land owners, local authorities, the engineer and manager of existing lines affected, and other parties interested are also supplied with copies. Previous to the 30th of November a notice of application to Parliament for permission to construct the line is published, containing a full description of the route of the same, defining its termini and giving the names of all counties, parishes, etc., roads altered or stopped up; and all such information must be published for one day in each of three consecutive weeks in some newspaper of each county in which the line is to be situated, as well as in the official "Gazette," and a London paper (Dublin for Ireland; and Edinburgh for Scotland). Notices of application must also be served on landowners, and others affected by the proposed line, on or before December 15th. After a week or two, during which the various plans and documents are arranged, they are opened to inspection at the private bill office in the House of Parliament, and for certain charges can be traced or copied in a room provided for the purpose, usually one of the committee rooms; and engineers of rival or competing lines can then obtain copies to compare with their own and look out for their rival's errors.

When the engineer, aided by the solicitor and parliamentary agent of his clients, has got all his plans, etc., safely deposited, and the deposit money paid (a certain percentage on the estimate), he begins to prepare for his opposition to rival lines, or others which he may be retained to oppose. For this purpose he gets a copy of plans, reference book and estimate if possible, or if not, gets them traced and copied at the private bill office or county clerk's office, and sends men into the field to detect errors, which are then carefully described and made as much of as possible by the solicitor in a memorial to the standing order committee, which memorial is lodged on January 9th, if the bill is numbered below 100, 16th of January if between 100 and 200, and 21st of January if above 200. Errors on plan, or in reference book, wrong numbers, numbers not corresponding in the same, omitting to give landowners notice, and similar cases, form pleas for non-compliance with standing orders. The examiners for standing orders sit in February and consider all the memorials and petition for and against each bill, in order to decide whether the rules embodied in the standing orders (certain standard rules to be complied with in every case, or only dispensed with by authority of the examiner), have been duly complied with, and reject or pass such bill, those rejected being *hors-de-combat* for that session. Appeal may, however, be made for re-examination, but this is very rarely granted; in doubtful cases the bill is submitted to the standing order committee, who give a final decision. From the examiner for standing orders of the House of Commons, the bill is carried to a similar official of the House of Lords, and if passed by both is then ready for the select committees.

Each committee is composed of five members, viz.: a chairman and four others, and has a certain group of bills to consider. They usually commence their operations about March (all bills going first before the Commons committee); and sit from 12 o'clock noon, till 4 P. M. each week-day except Saturday. The case is held in one of the committee rooms in the "House," the committee sitting behind a curved table, and the engineers, lawyers, counsellors, solicitors, parliamentary agents, short-hand writers, clerks, etc., sitting within a bar across the room, on the other side of which are the witnesses to be called. parties interested in the line, and the general public. Various witnesses are examined for and against the bill by the respective counsel, who also make long and exhaustive speeches. When the case for the bill is concluded the case for the opposition commences, after which the chief counsel of each party make their final speeches and after a (usually) brief deliberation the committee give it as their decision that the bill is, or is not, passed. Cases last from a few days to weeks, or even months, according to the length and importance of the line. If the bill is passed by the Commons it is carried before the Lords and the same performance gone through again; but if rejected by the Commons it is thrown out altogether, for that year's session at any rate.

During these operations the bill, which is a printed document setting forth the route of the line, names of promoters, amount of capital and other particulars, has had to be introduced into and read three times before each house, but unless the line is particularly important or noteworthy this is usually a mere matter of form. Should the bill be duly passed by the houses and their committees it is ready for the Queen's assent, upon receiving which it ceases to be a bill and becomes an Act of Parliament, in which form it is very different from its original, alterations having probably been made by each committee and stipulated requirements, as for accommodation works, etc., inserted, so that it is much more lengthy and contains more details than the original draft.

Summarizing these various stages: The line is projected probably in the summer or autumn; plans and reference book deposited, and notices published by November 30th; estimate deposited December 31st; memorials and petitions lodged 9th, 16th or 21st of January, the case goes before the examiner for standing orders in February or March, and reaches the committees sometime between March and August; the Queen's assent is obtained in August or September, and there is the Act of Parliament authorizing certain parties to build and maintain the A, B and C Railway. The act names the directors and promoters, states the capital and all financial details, nature of works, rates of tolls and fares, accommodations and all particulars, and when the line is a branch from an existing road a working agreement is frequently appended, stating the terms upon which the main company is to work the traffic on the new line.

The term for the completion of the work is usually put at five years (sometimes three). If the line is not completed in that time, an act for an extension of time may be obtained, or if neglected and no such act obtained, the company forfeits their interest in the work, as also the deposit money. An act for abandonment can be obtained which provides for the return of this money.

Preparations may now be made for letting the contract and starting the work.—[Edward E. R. Tratman, in the *Engineering News*.

RAILWAY STANDARDS.

THERE ought to be recognized standards in railroading as in everything else. What experience has proved to be the best should be generally adopted and no deviation permitted. Railways have increased in numbers and extent to such a degree, and their operations are so connected, that all thoughtful officials are convinced of the necessity for the adoption of a standard in appliances and methods.

There should be a standard of construction. We now have a gauge which has been adopted by all the northern railways and to which the southern roads are soon to be changed. A few lines exist which have the narrow gauge but they cannot long hold their own, for the economies of the traffic, which passes over several connecting roads, demand that no shifting of cargo or trucks be permitted. There is also a standard rail and a regulation size of tie. We might go further with advantage and have one style of construction which should be recognized as the best and to which all first-class railways should conform. Whenever this test becomes generally recognized, there will be established a code of rules governing the width of the right of way, form of embankment, size of ties and number to be used to the mile, weight of rails, length of sidings, and patterns of switches and signals. The form of stations, while uniformity is desirable for those on each road, will continue to be determined by choice and taste.

A standard for round-houses, freight-sheds, yards and shops will be selected and to this all will be made to conform as far as possible. As long as manufacturers compete with each other different styles will be used, but one type of construction will be universally adhered to as far as possible.

Standard equipment will be adopted. It is not so essential that every road have exactly the same kind of locomotives and passenger-cars as all the rest, but each line or division should have but the one style and the parts ought to be interchangeable. Time is lost and damage sustained because there are dozens of different kinds of locomotives in use upon the same road, and the shops must have patterns for the parts of each maker. If uniformity prevailed, parts could be kept in stock and in case of emergency be quickly attached.

It is more necessary that freight-cars be all of one standard, for they are shifted from one road to another and must each time be made up into trains. As it is now, some are high and some low, some have one kind of trucks and couplers and some another. Although there are many excellent automatic car-couplers known to railway master mechanics they cannot come into use because of this marked variance in cars. We want one size of wheels, style of trucks, drawbars and other appliances. Let them continue to come from the shops of different makers, each of whom will impress upon it his own individuality; but they must conform to one standard in all their parts which should be interchangeable.

There ought also to be a standard of operation. The first essential is a uniform system of bookkeeping so that all reports and statements can be easily understood and conceal no mysteries, known only to the uninitiated: the less of mystery there is about the accounts the better for all concerned.

Tickets, waybills and vouchering should be the same upon all the lines. We think the companies are inclined to come to this now, for the frequent conferences of the officials interested tend to the adoption of the forms most approved by experience.

This uniformity can only be accomplished by means of frequent meetings of railway men. The master mechanics and master car-builders now meet once or twice a year and so do even the conductors and brakemen. The freight men have gatherings as often as once or twice per month, while the general passenger agents for many years have held a semi-annual conclave of their National Association. The general superintendents also have their own special conferences.

These assemblies are not to be measured or tested by the amount of business apparently transacted, for this is a very superficial test. The meetings make those present acquainted and lessen the possibility for antagonisms; they furnish opportunities for explanations and consultation, so that when a meeting ends and it is said that nothing has been accomplished, the assertion is an unjust one, for the results cannot be immediately measured up and a value placed on them.

The presidents and general managers are beginning to see that a necessity exists for their frequent coming together. A cause of friction may be thus removed before it causes wide-spread dissatisfaction, and railway wars be so nipped in the bud. The railway interests of the country are immense and, unless care is used, at times conflicting. A conference of the principals will often remove a cause of dissatisfaction and restore harmony where correspondence could not avail.

Who can tell over the good results to come from the adoption of these standards as here advocated? Time would fail us to enumerate them. Sufficient it is to state two of the most conspicuous effects:

An economy of operation would result such as is now unknown or undreamt of. The ease with which parts of equipment could be interchanged, the greater clearness of knowledge, the more simplicity in methods, all would tend to that reduction in operating expenses which general managers so much desire.

The greater ease of operation would also be evident. The interchange of traffic and cars would be better accomplished with fewer delays and less friction. The dangers of accidents would also be decreased and property would consequently be safer. With a better knowledge on the part of the people with the workings of railways, there would be less inclination to interfere, and legislators would not interfere so frequently with vexatious laws.

By all means let us have these standards.— *Railway Register*.

Misleading Titles of Railways.

UNDER the caption of "What's in a Name?" a writer in the *Railway Review* strongly condems a number of corporate titles of American railways, and urges that their name should convey some idea of their routes. A foreigner, studying the guide-book to find the way to some distant point, would fare poorly, if he depended on the names of the railways to get to the point in question, For instance, let him be landed in New York and seek a way to Chicago. In the list of railways he would at once see, New York, Chicago and St. Louis. At once satisfied, he would immediately institute inquiries as to the location of the depot of that road in New York. He would be surprised indeed to learn that the nearest terminus of that road was over 500 miles from New York; also that it did not extend within 300 miles of St. Louis. Another misleading name is that of the Boston, Hoosac Tunnel and Western. This road does not touch a point mentioned in its coporate name. It is 153 miles from Boston, 1 mile from the Hoosac Tunnel and ceases 20 miles west of the Hudson river, remaining in the east, surely. Of the same class of names is the Western and Atlantic Railroad of Georgia, which neither reaches the Atlantic nor the west, its termini being Atlanta and Chattanooga. Another class of absolutely meaningless names exist, such as the Northern Central, the Southern Central and worse still the European and North American Railway, (now part of the Maine Central Railroad). This latter road has less than 200 miles of track, with a name good for over 3,000 miles of deep water.

The next class of names include those expressing truthfully the points they reach but which have grown way beyond their names, so that such a corporation will operate many hundreds of miles while the name covers but a few. Of these are the Philadelphia and Reading, with a 60-mile name, operating 1,458 miles, and the Boston and Lowell, with a 26-mile name, and a mileage of 550. The Chicago, Milwaukee and St. Paul is another road having originally a fine and instructive name for every traveler, but long since outgrown and now misleading for much of its vast territory.

Two names for railways come to mind which mean nothing unless one is either well posted in the early history of the country, or knows every city in it of over 20,000 inhabitants. The first reference is to the Old Colony, so named because it extends through the earliest settlements of New England, made famous by the Pilgrim Fathers. This road has one of the finest plants for local business in the world, with no competition and no entangling alliances with freight lines, pools, etc., and so makes money every year; but unless one lived close to it they might think in vain as to its location. The other reference is to the Fitchburg road, which from its location and business suffers much more from a meaningless name than does the Old Colony, which can flourish without much outside help. The Fitchburg is one of New England's principal arteries to the west, but it bears the name of a little city on its line which few people have heard or know of, and with the location of which still fewer are familiar, yet the road reaches Boston and extends to the famous Hoosac Tunnel, with a direct connection for Troy via a shorter, but better named road, the Troy and Boston. Why the name of such an insignificant place as Fitchburg should have been given to a railway will always remain a mystery to stranger travelers. Had it been Boston and Fitchburg it would have shed some light on its location. Its greatest competitor bears one of the most perfect and instructive of railway titles, viz.: Boston and Albany—a whole story of itself. Equally fortunate in name is the Boston and Providence, the Philadelphia, Wilmington and Baltimore and other titles which include names of extreme terminal points. A wider but good and truthful class of names are the Boston and Maine, Baltimore and Ohio, Chicago and Eastern Illinois, and Chicago and Northwestern (the latter a blanket title, in truth). A class, local and yet broad enough, includes the various "Centrals"—New York Central, Maine Central, Central of New Jersey, Michigan Central, etc., to which everyone would look if about to travel in those states. With these should be included the Pennsylvania.

It is supposed to be allowable to attach the word "western" or "northern" etc., to any road leading in either of those directions. This is in better taste than that of the originators of the "Big 4," road which sails under the title of Cincinnati, Indianapolis, St. Louis and Chicago, reaching but the first two of these cities and pointing towards the last two. Fully as presumptuous a name is that of the Boston, Concord, Montreal and White Mountains (now a part of Boston and Lowell) which reaches neither Boston nor Montreal and operates only about 100 miles of road. Of long names for short roads, a most amusing one is the Bedford, Springfield, Owensburg and Bloomfield, which impressive title used to cover an Indiana road only 42 miles long—narrow gauge at that. The name was too great a burden for the road and it was re-organized and is now called the Bedford and Bloomfield. For ambition, the Beach Haven, International, Transcontinental and Intercolonial Railway, the title of a recent New Jersey project, appears to deserve the palm. One of our best-named roads is the New York, West Shore and Buffalo, as is also its parellel and greatest competitor, and many others that could be named. In fact this subject could be carried on at a great length, but enough has been written to call attention to the incongruous and misleading naming of a large percentage of our railways.

Railways in Central Asia.

THE Central Asiatic Railway will now be pushed forward very energetically, in pursuance of the recent imperial order. Gen. Annenkoff, charged with the direction of the necessary works, has already started for the Trans-Caspian, and has reached there before this time. Great attention is paid in Russian circles to this railway, which will be of the utmost importance, not only strategically, but also in its relation to commerce. The line will go in a direct southeastern direction to Kakhka, which place is about half-way between Askabad and Sarakhs, but then the road will take a northeasterly direction to Merv and further to Bourdalik, on Amu-Daria. In this way the railway, which has hitherto closely followed the Persian frontier, will suddenly branch off at an angle and be continued to a distance of about 50 miles from the new Russo-Afghan boundary, which is thought will be settled by the negotiations between England and Russia. The considerations which have determined the

government to choose this direction for the railway are commercial ones, and the line now will be connected with the principal fluvial communications in the Russian possessions in Central Asia, also with the great caravan roads. The expenses of keeping up the railway will be serious. They are calculated at nearly 2,000,000 roubles a year, and during the first year or two the receipts will scarcely amount to 200,000. After that time, when the Central Asiatic merchants have learned to appreciate the new means of communication, the traffic may be expected to increase largely. It is said on good authority that the Central Asiatic railway will be continued next year across the Bokharian territory to Samarkand, and from thence to Tashkend, the residence of the Turkestan Governor-General. The distance between the two towns is 260 English miles.

Origin of Petroleum.

AS to the origin of petroleum, scientific men are by no means agreed. In the early period of American oil mining the only question much debated was whether it was of animal or vegetable origin, or both. Of late, however, a theory has been started that the oil is not due to the storage of organic remains under the surface, but that it originated from chemical combinations of carbon and hydrogen in the interior of the earth. This view of the subject has been taken up in consequence of petroleum having been found in such large masses as almost to preclude the idea of its origin in animal or vegetable deposits. If this be true, it is probable that the oil exists in still larger quanties than any which have yet been observed.

Canadian Branch Lines.

WHAT branch lines have been and are to the transcontinental lines in the United States, is seen in the facts presented by Mr. Chapleau, in the Canadian legislature. Out of a total of 16,277 miles, comprising the mileage of the seven different railways in that country working their way from the Atlantic to the Pacific, 6,775 miles are branch lines. Of a total of 1,442,800 tons carried by the Northern Pacific only 67,275 tons were through freight. The Union Pacific had $10,427,540 of local freight against $2,512,507 of through traffic. The Central Pacific carried 814,700,000 pounds of through and 3,888,308,000 pounds of local freight.

Pacific Railroad Earnings.

THE Secretary of the Treasury has issued a circular publishing, for the information and guidance of all concerned, the recent decision of Second Comptroller Maynard in regard to compensation due the Central Pacific Railroad Company for services rendered the Government, and announcing in accordance therewith that Department Circular of June 27th, 1883, and Circular Letter of January 12th, 1884, are revoked, and that all compensation now due or which may hereafter become due that company, will be covered into the Treasury and one-half thereof applied to the extinguishment of interest which has meanwhile accrued on the Government Subsidy Bonds, and the other half credited to the Sinking Fund, as required by the Thurman act.

Valuation of the Philadelphia and Reading's New Jersey Property.

TESTIMONY is now being taken at the office of the Philadelphia and Reading Railroad, in this city, in the matter of the valuation of the property of that road in the State of New Jersey, as assessed by the State Board of Assessors for the purpose of taxation, and to whose valuation the road took exception. A large array of counsel is present on both sides. The State is represented by Attorney-General Stockton, Barker Gummere, W. S. Gummere, Wm. Corbin, ex-Judge Hoffman and Robert Stockton. The Philadelphia and Reading Railroad is represented by ex-Chancellor Williamson, R. W. De Forrest and Mr. Kaercher, and the Long Branch Railroad by George M. Robeson, while A. G. Ritchie appears for the Delaware and Bound Brook Railroad.

Coke as Locomotive Fuel.

TWO locomotives on the New York, Lake Erie and Western road are now being run experimentally with coke, with a view to testing that fuel for use on passenger-trains. The two engines in question are at present running on one of the express-trains between Jersey City and Port Jervis, on the Eastern Division.

Strong and Weak Woods.

THE strongest wood in the United States, according to Prof. Sargent, is that of the nutmeg hickory of the Arkansas region, and the weakest the West Indian birch (*bur seva*), The most elastic is the tamarack, the white or shellbark hickory standing far below it. The least elastic and the lowest in specific gravity is the wood of the *Ficus aurea*. The highest specific gravity, upon which in general depends value as fuel, is attained by the bluewood of Texas (*condalia obovata*).

A Novelty in Railways.

AN air-balloon railway is about to be constructed in Switzerland, on the Gaisberg, near Salzberg, a mountain of no great height, but offering a magnificent view over the beautiful neighborhood of the town. The balloon, which will have grooved wheels on one side of its car, will ascend to a perpendicular line of rails, constructed on the principal of the wire-rope railway invented years ago for the Rigi, but never put in operation.

The First Railway in San Domingo.

A RAILWAY is being built from Samana bay to Santiago de los Caballeros, in the island of San Domingo. Of the total 88 miles 40 are now graded, and it is expected to have 65 miles in operation by next spring. The road runs along the Yuna river, up the valley of La Vega Real, and will be the first on the island. The road is purely a private enterprise in the hands of British capitalists.

The Great Canals of the World.

THE Imperial Canal of China is over 1,000 miles long. In the year of 1861 was completed the greatest undertaking of the kind on the European continent, the Canal

of Languedoc, or the Canal du Midi, to connect the Atlantic with the Mediterranean; its length is 148 miles, it has more than 100 locks and about 50 aqueducts, and its highest part is no less than 600 feet above the sea; it is navigable for vessels of upward of 600 tons. The largest ship canal in Europe is the great North Holland Canal, completed in 1825; it is 125 feet wide at the water surface, 31 feet wide at the bottom, and has a depth of 20 feet. It extends from Amsterdam to the Helder, 51 miles. The Caledonia Canal, in Scotland, has a total length of 60 miles, including three lakes. The Suez Canal is 88 miles long, of which 66 miles are actual canal. The Erie Canal is 350½ miles long; the Ohio Canal, Cleveland to Portsmouth, 332; the Miami and Erie, Cincinnati to Toledo, 291; and the Wabash and Erie, Evansville to the Ohio line, 374.

Taking up Tickets on Sleeping-Cars.

THE following notice, recently issued to conductors by General Passenger and Ticket Agent St. John, of the Chicago, Rock Island and Pacific road, is of general interest:

"Your attention is called to rule 52 in book of instructions, which reads as follows:

"'52. We do not desire that passengers holding through tickets, and occupying berths or sections in the Pullman palace sleeping-cars shall be unnecessarily annoyed after they have retired, and to prevent such annoyance the Pullman palace-car conductor is instructed to take up the tickets of all passengers in his car on retiring, and hold them for the examination of and proper cancelling by the conductor in charge of the train, who will ascertain by personal observation that he has a ticket or pass for each passenger, and then return them to the sleeping-car conductor for delivery to the passengers in the morning, unless they expire on his division, in which case he will, if necessary, take them up.'

"I want to impress upon you the necessity for making a personal examination as to the number of passengers in the sleeping-cars on your trains, and while the greatest care must be taken to avoid in any way offending the occupant of any berth or unnecessarily disturbing passengers after retiring, you must, with the assistance of the sleeping-car conductor, satisfy yourselves that you have a ticket or pass for each passenger. Sleeping-car conductors have been instructed to coöperate with you in this matter. The fact that the company has been defrauded in a great many cases recently is an indisputable one."

Old Locomotives.

A RECENT issue of the *National Car-Builder*, mentions a number of instances where old locomotives are still doing active service. The Illinois Central road has twelve Rogers locomotives in service that have been running over 30 years, and they still have the original boilers in use. Most of these engines are light, weighing about 25 tons, and have cylinders 15 × 22 inches and wheels 5 feet in diameter. The engines are now getting too light for the work on the road and they will probably be cut up within a very few years, and the company can well afford to put the engines aside, for few locomotives have earned an equal amount of money. The oldest engine still running on the road is a Rogers make, which has been in service 33 years. Nearly 30 years ago this engine was run for some time by Mr. Morris Sellers, the well-known railway supply dealer, and at that early day the engine was regarded as a wonder among locomotives, owing to the astonishing weight of trains she could pull.

A Chat About Car-Wheels.

AN official of the Pennsylvania Railroad stated recently that there are fully 10,000,000 iron car-wheels in use on American railways. That figure does not include the wheels on palace-cars and the better class of passenger-cars.

"How much iron does it take to make a wheel?" he was asked.

"About 525 pounds of pig-iron," he replied, "and about 1,250,000 wheels are worn out every year. But do not conclude from that that the iron men are called upon to supply the 312,500 tons of material required to make the new wheels; because the worn-out wheels themselves supply about 290,000 tons."

"How long will a good car-wheel last?"

"Formerly it would last eight years. But now the reduction of railroads to a standard-gauge and the improvement in loading and unloading facilities keep the length of service down. This is because the uniformity in gauge keeps the cars in more continuous use, and the improvement in loading and unloading facilities enables the cars to be put to more active service. The wheels on palace-coaches and on first-class passenger-coaches are known as paper wheels. They are made with a steel rim or flange, and iron hub; but the web is composed of sheets of paper cemented together. They combine lightness with strength."

Time on Lake Constance.

THE lake of Constance is only some fifty miles in length, but any one who travels from pier to pier and wishes to know the right time of day at each ought to carry five watches. Its waters wash the shores of five different states—Austria, Baden, Wurtenburg, Bavaria, and the Swiss Federation. If you land at Rorschach and want to catch the train for Ragatz or Chur, your watch ought to stand at Bern time. In Friedrichshafen you must know the Stuttgart time, in Constance the Baden time, in Lindau the Munich time. The Austrian time is not reckoned from Vienna, but from Prague, which differs no less than twenty-eight minutes from the Bern time. Hence a traveler crossing over the Austrian frontier at St. Margareten must put back his watch half-an-hour in order to set himself right at the Swiss station. This non-conformity among the clocks may be an amusement, or merely a slight inconvenience, to the tourist, but it must be a serious hindrance to the men of business in this centre of increasing international traffic.

Railway and Steamship Speed.

IT seems rather absurd to talk about a steamship beating a railway-train in a long-distance contest, says a local newspaper, but it begins to look as though it might happen. It is already a fact that the fastest boats

on the transatlantic lines make almost as good time as the Pacific railway lines do from the Missouri river to the western coast. From Omaha to San Francisco, by the Union and Central Pacific lines, is a distance of 1,928 miles, or about two-thirds the distance between Queenstown and Sandy Hook. The schedule time by the fastest train between Omaha and San Francisco is eighty-eight hours, lacking ten minutes, which makes the average rate of speed a trifle under twenty-one miles per hour. The *Etruria*, on her recent trip, which "beat the record," made an average across the Atlantic of 445 miles per day, or almost exactly nineteen miles per hour. The steamship has thus come within three miles an hour of the transcontinental train, and as the time of the ocean passage is being steadily cut down, it looks as though one would before long cross the Atlantic as rapidly as he can get across the western part of the continent.

Railway Subsidy in Colombia.

A CORRESPONDENT of the *New York Herald* says that the United States of Colombia, with a surplus revenue of only $1,000,000, have undertaken the following subsidized projects:

1. A railway from Cauca to the Pacific, of which 30 miles have been constructed.

2. A railway from Cundinamarca to the Magdalena river, 15 miles built.

3. A railway from the Magdalena to the capital of the State of Antioquia, 48 miles built.

4. A railway between the upper and lower portions of the Magdalena, where navigation is interrupted by the rapids, 16 miles built.

5. A railway from Santander to the Magdalena, 6 miles built.

6. Railways from the sea coast to Barranquilla and Clenaga, in the States of Bolivar and Magdalena, 32 miles built.

A Telegraphic Railway.

AN ingenious Philadelphian has invented a device for telegraphing passengers and goods through the air, which is described in the Bulletin of the Inventor's Exhibition at Philadelphia: "The field it proposes to occupy is a comparatively narrow and modest one, as it does not seek to rival the locomotive, but is satisfied with the prospect of operating in districts incapable of furnishing traffic adequate to the support of a railway. Sturdy posts may perhaps be called its road-bed, as they support its two cables, one of which is about eight feet higher than the other, additional cables being supplied to insure absolute safety. The cars are suspended from the upper and supported by the lower cable. Steam-engines and dynamos at each end of the line supply the driving-power, and by means of the car-wheel axles and intervening wires the current is passed through an electrical motor working under or by the side of the car. The carrying capacity of the cable varies, inclusive of cars, from several hundred-weight up to a ton, and repeated tests have demonstrated that smooth and swift motion can be attained. During its stay at Manly & Cooper's, on Forty-second street and Elm avenue, this curious appliance attracted much attention. Our personal experience fully confirms the statement of our esteemed contemporary, the *Ledger*, that 'A system of light carriage of paseengers by electricity like this, or such as this might be developed into, appears to be a desideratum for places in the suburbs of cities, and especially for the park.'"

The Car-Coupling Tests at Buffalo.

THE car-coupling tests conducted by the executive committee of the Master Car-Builders' Association commenced at Buffalo, N. Y., on September 15th, and continued for three days. In all forty-six patent couplers were submitted for trial, and they were subjected to thorough and severe tests under all practical conditions. The following of the number were recommended by the committee for further tests and will be put in practical use until the next meeting of the association: Ames, Archer, *Cowell*, *Dowling*, Gifford, *Hien*, *Janney*, McKean, Marks, Perry, *Thurmond* and *Titus & Bossinger*. Six of these twelve devices are link-and-pin couplers and six vertical-hook couplers, the latter being indicated in italics.

America Claims the Honor.

[COMMUNICATED.]

Editor American Railroad Journal:

DEAR SIR:—In your August issue, the heading of the article "The Longest Draw-Span in the World" is an error. The Raritan Bay Point Span on the New York & Long Branch Railroad, over Raritan Bay, N. J., is 472 feet long, weighing 600 tons. It was designed by J. H. Linville and built by the Keystone Bridge Co., in 1875.

Yours respectfully,
JONES & BENNER,
Engineers and Contractors.

PHILADELPHIA, PA., September 4th, 1885.

THE first train on the Syracuse, Phœnix and Oswego Railroad ran on September 7th. The road has been leased to the Rome, Watertown and Odgensburg company, and and runs to Syracuse, using parts of the New York and Oswego, and Rome, Watertown and Oswego tracks, and will compete with the Delaware, Lackawanna and Western road.

A CORRESPONDENT of the Boston *Globe* urges the building of iron or steel railway-cars. Because steel ships have been a decided success, he infers that steel cars would be the same, and claims that they would be more secure against fire and telescoping than wooden cars.

THE first "tea-train" over the Northern Pacific left Tacoma, August 8, and reached New York City, August 17, making the run in 8 days and 4 hours, the distance being 3,378 miles. This is the fastest record ever made by a freight-train for so long a distance.

The Novelties Exhibition of the Franklin Institute is now in successful operation in Philadelphia. The exhibition will remain open until October 31st, and special railway rates are offered by the management for excursions from a distance.

THE Pennsylvania Railroad is introducing steam steering-gear in the ferry-boats which ply between Jersey City and Cortlandt and Desbrosses streets, New York.

IT is announced that the Quettah (India) railway is to be at one extended 30 miles, and perhaps to Candahar.

American Railroad Journal.

A MONTHLY MAGAZINE AND REVIEW.

(ESTABLISHED IN 1831.)

PUBLISHED AT No. 323 PEARL STREET, NEW YORK.

J. Bruen Miller, ... Editor.

Entered at the Post Office at New York City as Second-Class Mail Matter.

SUBSCRIPTION RATES.

Subscription, per annum, Postage prepaid.....$3 00
Single copies..... 25

ADVERTISING RATES.

Space (3¼ in. wide).	1 Mo.	3 Mos.	6 Mos.	12 Mos.
1 inch	$4.00	$10.00	$17.00	$31.00
¼ col. (or ⅛ page)	9.00	22.00	40.00	70.00
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NEW YORK, SEPTEMBER, 1885.

Principal Contents of this Number.

THE PARALLEL ROAD.

A CONTRIBUTOR in this month's issue dwells feelingly upon the subject of "paralleling," and sums up the evils resulting in the simple phrase, "Two into One—No Times, with Nothing Over." That covers the ground. The present era of railway receiverships, the unsatisfactory record of railway operation during the past year and the business depression generally, perhaps put us in a reflective mood and we are greater philosophers than we were in the hey-day of our prosperity. Therefore we are disposed to accept home truths when they are presented. But whether we are prepared to take time by the forelock and guard against similar depression in the future, is another question. We confess that things are not as they should be, but we are not quite ready to say what is best to be done to put them on a right footing.

In truth the subject of railway paralleling is a ticklish one to handle. A railway corporation has certain rights and privileges and it is proper that they should exercise them to the fullest extent; but legislatures are reluctant—and well they may be in this anti-monopolistic age—to bestow exclusive privileges upon any railway. It may be true that the business through one section of territory is sufficient for one road only, and that the construction of a parallel road will lead to the bankruptcy of one or both; but it is neither wise nor advantageous to a commonwealth to enact that one road shall have perpetnal monopoly through such territory. The time may come and probably will when the requirements of trade and travel will demand the construction of a rival road and who shall be the judge as to when such a period has arrived? It has been suggested that the earnings of a road shall be the basis of its claim to exclusive rights, and that so long as its profits do not exceed a certain percentage of the capital invested so long shall a rival road be prohibited. But it is an easy thing to circumvent a favorable showing and keep the profits just within the prescribed limits.

The legislator as well as the investor is confronted with a practical problem, a solution to which is difficult to obtain. On the one hand there is a pressing necessity for such action and legislative enactment as will insure a road a fair field of operation where a reasonable profit can be obtained. The incorporation of a road gives it a certain claim upon the state for reasonable protection and the interests of the state are conserved by its just treatment of its corporations. On the other hand there is the well-grounded fear of monopoly that is always present when exclusive rights are granted. More than one state has reason to curse its folly when it considers its helplessness regarding the encroachments of corporations with perpetual and exclusive charters granted years ago.

Who, then, shall lead us to the right path and solve the

pressing question of railway rivalry? The question must be solved and the railway industry must be put on a different footing, but the Moses is yet to appear. Certainly he should not be a railway capitalist whose sole aim is to secure heavy returns from his invested millions, nor yet an anti-monopolist who imagines that railway construction and operation is at best a species of extortion. Some happy compromise candidate between these two extremes should achieve the mosaic distinction, and we await with expectant interest the utterance of some unknown who will eventually set things straight.

But in the meantime common-sense will do much, and common-sense should teach us that there is a vast difference between a competing road and a parallel road. To be sure, a parallel road is always a competing road, but a competing road is not necessarily a parallel road; and for convenience the word parallel has been given a stigma in railway parlance. The competing road is a legitimate and often friendly rival. It is organized and constructed for the purpose of obtaining business where it thinks there is a chance to secure a profit, and the fact that another road is already obtaining business in its contemplated field is duly considered and the chances for both doing a profitable business carefully calculated. Generally the new road hopes to obtain the bulk of business through some intended superiority either in directness of route and consequent short time, or through other adventitious circumstances. The builders of the road take their chances and stand or fall according to the correctness of their judgment.

The parallel road, per contra, is a pirate. A parcel of fools could lay out a parallel road, and it would probably answer the purpose for which it was constructed quite as well as if the wisest heads in the country had planned it. Its sole object is to injure another road and inaugurate a battle of purses. The richer road will hold out the longest, and the poorer must eventually go to the wall and be swallowed up. To the projectors of the parallel road it makes little difference how much capital is wasted in the struggle. They argue, and their argument is sound, that the world is pretty largely peopled with lunatics where investment is concerned, and that no wild-cat railway scheme ever fell through from lack of stockholders. Not infrequently also, the parallel road is constructed with other ends in view; with the avowed purpose that the rival road shall purchase it, a pleasant blackmailing feature being thus introduced.

A competing road and a rival road are two very different institutions and should be very differently considered. Perhaps when their precise relative status is established the aforementioned railway Moses will appear and solve the question of railway rivalry in a direct and comprehensive manner. In the meantime there need be no fear. The solution will be reached sometime, and that sometime is almost here. It is related of a traveler in the western districts that he observed a boy digging vigorously in an opening near a sparsely settled town. "What are you digging for, boy?" asked the traveler. "A woodchuck," answered the youth curtly. "Do you expect to get him?" was asked. "Got to get him!" was the answer, "our family is out of meat." The solution of the railway problem is a species of woodchuck. It must be reached; the railways are out of "meat."

THE CAR-COUPLING TEST.

THE car-coupling test conducted by the executive committee of the Master Car-Builders' Association, at Buffalo, has resulted in demonstrating the impracticability of a large number of coupling devices, and in the recommendation for further trial of a dozen that proved successful under the rigid conditions of the test. As far as it went the test was a good thing, but we are not disposed to assume that the couplers singled out for approval represent the only reliable and practical coupling devices that have been invented. The expense of the test to each inventor was considerable, and it is fair to assume that the inventors of devices of equal merit to those recommended, were deterred from entering their couplers for tests through lack of funds. The coupling question is not yet solved.

TERMINAL EXPENSES AT NEW YORK.

NOT long since the writer stood upon a North river ferry-boat and observed a seeming wise-acre point to the Jersey shore and in a regretful tone remark to a companion: "It's a pity there is not more water-front there. A new road from the south or west would be unable to secure an independent outlet for its New York terminus." Possibly the wise-acre could not be much blamed for his remark, and quite possibly ten out of every dozen persons would think the impossibility of securing an independent terminus at New York an insuperable obstacle to the successful construction of a road desiring to reach the metropolis. In the old days it is quite possible that a railway itself would regard such impossibilities as an obstacle, but times have changed. When, as is stated, the expense of maintenance of the Pennsylvania road's New York terminus is upwards of one-half the total expense of maintenance of the entire line between Jersey City and Philadelphia, and when it costs as much and often more to transport freight across the North river as it does to carry it the rest of the way to Philadelphia, the independent terminus seems to be a species of white elephant. Certain it is that the roads recently acquiring termini of their own at New York have steadily reported losses thereon, and the sweet sense of ownership is not without

its drawbacks. Terminal expenses are terrible things to contemplate, and a road should have ample justification before it seeks to acquire an entrance of its own into New York.

In sober truth, there seems to be no reason why a line reaching New York over the line of another road should branch out for an independent connection unless it is subjected to extortion and injustice, for terminal expenses falling on several roads can be easier met. The minimum of terminal expenses are enormous and every additional terminus increases the competition, and consequently tends to reduce rates. A road having a satisfactory contract for obtaining access to New York had better let well enough alone. When their business becomes so great that they cannot be accomodated, then there is time enough to talk about independent connections. But the increasing business can better afford to wait for accomodation than increased accomodation for business.

EDITORIAL NOTES.

THE International Railroad Conference which met in Brussels last month, as might have been expected, did not accomplish much of practical benefit to American railways, nor, do we believe, to the railway systems of any of the twenty-two countries represented in its deliberations. The reports of the discussions have not been received at length, but it is evident that if there were twenty-two countries represented, there were twenty-two ways of looking at the questions considered, and, doubtless, each way is the best for its respective country. The time is not yet for the adoption of universal railway rules and regulations, and while the conference commands our respect as a representative gathering of railway men, it was more ornamental than useful. The time will come when the deliberations of such a conference will be of practical benefit.

* * *

CHICAGO now boasts of being the greatest railway center of the world and proudly points to the twenty-two roads running into the city. Chicago has many things to boast of, but this is the most unanswerable of her claims to preëminence. The railway and the city are about coeval in existence, and in the short space of fifty years this mushroom, inland city, as our English friends are wont to characterize it, ranks first in the magnitude of its railway operations.

* * *

MISERY loves company, and in the midst of our dreary railway prospects we can extract some few grains of comfort from the fact that our transatlantic neighbors are quite as badly off. The French railways show a decrease of earnings during the past half-year, from the earnings during the corresponding period of 1884, of 3.87 per cent.; the Spanish railways a decrease of 3 per cent.; and twenty leading British lines a decrease of 2.19 per cent. The only great powers whose railways show an increase in earnings are Germany and Italy, the former but a meagre increase of .03 per cent., while the South Italian lines give a comfortable increase of 7.1 per cent. The increase of mileage among European railways has been slight, and the general average of their condition is not much better than that of our own roads. The past year has apparently been a bad one for railways everywhere.

* * *

ONE feature of the speed question has been satisfactorily settled, and despite the boasting of our English brethren that they run the fastest railway-trains in the world, they must, perforce, take a back seat when it comes to yachting. The *Puritan* is to-day probably the fastest sloop afloat, and we may rest assured that many years will elapse before our cherished *America* Cup will be taken from us. We have also a sneaking idea that if such a thing were possible as an actual test of speed between representative American and British railway-trains, we could surprise our friends across the water with a superiority they do not suspect, or, at least, do not admit. We would greatly like to match these two trains on one of our great lines and then let them run 1,000 miles "to windward and return," and would back America in the contest.

* * *

THE Philadelphia and Reading road has issued a time-table in modified form, the stations being printed across the top and the trains across the side, reversing the usual order of time-tables. On the whole it seems a decided improvement, and we are somewhat surprised that such a modification has not been thought of before.

* * *

WE take pleasure in announcing that the series of papers on "Railway Medical Service," published in the JOURNAL some months ago, will be resumed, and that our October issue will contain the first of the new series. The author, Dr. S. S. HERRICK, secretary of the State Board of Health of Louisiana, has prepared them with great care, and they cannot fail to prove of practical benefit to our readers.

* * *

A VERY sensible order has been issued by the superintendent of the Louisville and Nashville road, that the watches of every engineer shall be inspected and condemned if not found to be accurate time-pieces. An inspector and general time-keeper has been appointed, and already several of the engineers have had their watches condemned as unreliable and untrustworthy. Truly it is said that a poor time-piece is worse than none

at all, and it is also safe to say that more than one disastrous accident has occurred on railways owing to the error of a few minutes in the time reckoned by the engineer. But would it not be better for each road to supply every engineer with a chronometer of such excellence that the correct time may be furnished by the railways themselves? That would be putting the responsibility where it should belong.

CASSELL & CO.'S *Magazine of Art* continues to take the lead among art journals, and the October number is a most artistic issue. In every detail the magazine is worthy of the art it represents and is a most attractive expontent of the engraver's skill. The letter press is excellent as usual, and the contributions of interest and value. *The Quiver* for October, published by the same house, is also an excellent number.

UNDER the savory title of *The Cook*, the housekeeper is at last furnished with a "trade paper." That cooking is a trade, and a difficult one at that, is undisputed, and this lively little journal, published in this city by the Cook Publishing Company, has achieved a wonderful popularity in the six short months of its existence. Its "Menus for the Week" are sorely tempting reading and have a marked effect upon the hungry reader.

N. W. AYER & SONS' *American Newspaper Annual*, for 1885, is published as a large octavo of 996 pages and presents a carefully prepared list of all newspapers and periodicals published in the United States and Canada. In the arrangement and character of the information furnished this annual is one of the best of its class, and of great value to the systematic advertiser.

"THE Application of Wire Rope Tramways for Purposes of Economical Transportation," is the title of an interesting little illustrated pamphlet by F. C. Roberts, C. E., published by the Trenton Iron Co., of Trenton, N. J. The system is thoroughly discussed therein, and its advantages enumerated at length.

A MOST useful little work is the "National Standard Encyclopedia," published A. L. Burt, at 162 William street, New York. The volume is an abridged yet complete encyclopedia, embracing upwards of 20,000 subjects in every department of knowledge, and furnished with over 1,000 illustrations. It is sold for $1.

The Monetary Times and Trade Review, of Toronto, Canada, recently celebrated its nineteenth year of publication. *The Times* is steadily improving and widening its sphere of usefulness, and is among the first of Canadian financial journals.

UNDER the title of "Some Facts About Patent Leather, Which May be Worth Reading," Messrs. E. H. Reynolds & Co., of Newark, N. J., publish an interesting little pamphlet describing the entire process of manufacture of patent leather.

A NEW and interesting exchange is received in the *Black Diamond*, a monthly journal published in Chicago by the National Coal Exchange, and devoted to the interests of the coal trade industry.

The Railroad Telegrapher is a well-edited little monthly published at La Porte City, Iowa.

Street-Railways.

American Street-Railway Association.

President.—Calvin A. Richards, President Metropolitan Railroad Company, Boston, Mass.

First Vice-President.—Julius S. Walsh, President Citizens' Railway Company, St. Louis, Mo.

Second Vice-President.—Henry M. Watson, President Buffalo Street Railroad Company, Buffalo, N. Y.

Third Vice-President.—Edward Lusher, Secretary and Treasurer Montreal City Passenger Railway Co., Montreal, Canada.

Secretary and Treasurer.—William J. Richardson, Secretary Atlantic Avenue Railroad Company, Brooklyn, N. Y.

Office of the Association, cor. Atlantic and Third Avenues, Brooklyn, N.Y.

The Fourth Annual Convention of the Association will meet in St. Louis, Mo., on October 21st, 1885.

CONVENTION OF THE AMERICAN STREET-RAILWAY ASSOCIATION.

ELSEWHERE we call the attention of our readers to the approaching fourth annual meeting of the American Street-Railway Association, to be held in St. Louis on the 21st of October. As will be seen, the preparations are in active progress, and every indication points to a large and influential gathering of representatives of American street-railways, and the topics to be discussed are those of vital interest to every company.

It is gratifying to note the marked increase of membership in the association during the past year, and that one-fourth of all American street-railways are now enrolled as members. But where are the remaining three-fourths? Doubtless in representation by capital, the association has far more than one-half the total capital invested in street-railways represented in its membership, and the non-members are chiefly small and unimportant companies; but none the less are they to be pitied for their indifference with regard to the national association. Whether a street-railway company be large or small, whether it runs one car or one hundred, whether it is one mile long or ten miles long, there are certain subjects to be considered that are of as great an importance to a small line as to a large one. The vexed questions which are discussed and carefully reported upon by committees at the meetings of the association are those which have occupied the attention of street-railway officials for years, and until the organization of the American Association, no means existed to secure concerted action in their consideration and settlement. Since the organization of the association, these questions have been discussed in the light of the most thorough experience in every important American city, and the companies are able for the first time to know the general experience of all lines before reaching definite conclusions. The beneficial results of such knowledge have been made manifest in many ways, but no more striking instance is shown than in the organization of the American Street-Railway Mutual Insurance Company. For years the street-railways of this

country have been paying exorbitant premiums upon their policies of fire insurance, amounting, as has been demonstrated, to more than twice the actual cost of such insurance. Probably the companies would have gone on until the end of time and continued to pay these extravagant premiums in ignorance of the injustice done them by the insurance companies, had not the organization of the American Street-Railway Association instituted an inquiry in this direction, resulting in the exposure of the exorbitant rates charged, and almost immediately thereafter in the organization of an insurance company by street-railway men and for street-railway men, offering insurance at reasonable rates and cutting down premiums nearly one-half.

We could instance other results following the organization of the American Street-Railway Association all tending to show the benefits to be secured from membership, and we are strong in our appeals to all companies to acquire it. At a nominal cost, the privileges of membership are placed at the disposal of every road, and each road has an equal voice in deliberations of the association irrespective of its capital or of the magnitude of its operations. It is safe to say that no single road could obtain the information furnished at a meeting of the association for ten times the cost of membership, and we issue a warning notice to the three hundred and fifty street-railways of the country that have not yet become members of the association that they are wasting valuable time. The time to join the association is now—not next year nor the year after,

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BROADWAY has no sooner been favored with a surface road than, as might have been expected, a scheme is on foot to construct a similar road on Fifth avenue. Naturally this scheme meets with hearty opposition, much of which is well-founded and much ill-founded. There is a class of persons who will oppose anything and everything simply for the sake of being on the side of opposition, and this class has its customary say in antagonism to the Fifth avenue road; but there is a large class of property-owners along the cherished thoroughfare who do not seem to view the contemplated road with favor, and certainly the opinion of these persons are worthy of every consideration. It is, however, folly to claim that that portion of Fifth avenue lying south of Madison square is any longer a street of residences exclusively, and a possible compromise may be effected in constructing the line of the road only through such portion of the avenue. Trade has crept in alarmingly in Fifth avenue below Twenty-third street, and if the majority of property-owners on that portion of the street desire a street-railway to be built thereon, there is no reason why they should not have it.

OFFICIAL RECOGNITION OF STREET-RAILWAY IMPROVEMENTS.

BY F. MARTIN GAYLER.

[Written for the AMERICAN RAILROAD JOURNAL.]

ON the eve of the approaching convention of the American Street-Railway Association I would like to offer a suggestion to that honorable body whose power and usefulness to street-railway interests has long since been recognized. From an inspection of the last annual report of the association it appears that the organization is in a most satisfactory shape and is prepared to grapple with all street-railway problems until a successful solution is reached; and it has occurred to me that the association could do much to stimulate the inventive spirit among street-railway men in every capacity, if it were to offer yearly premiums to be awarded to those who furnished the best practical improvements in street-railway methods and devices. The amount of the premium need not be large, but the knowledge that official recognition awaits meritorious improvements in street-railway methods would prove a great incentive to the production of such improvements.

Whether the premiums should be general, allowing the competitor every latitude as to the nature of the device or improvement; whether it should be limited to one single feature at a time, or whether several premiums for a corresponding number of devices should be offered, are questions of detail that can readily be settled at the convention and by the association, but, in general terms, the premium system commends itself to me as a practical system by which the association can accomplish much in the way of street-railway improvement.

In the matter of cars, for instance, a premium could be offered for the best practical model of a street-car submitted to a committee, who shall act as judges, This committee can be so organized that their dictum as to the best model submitted would be final. Such decision would not, in any way, bind the association or its individual members to the adoption of the model, but would merely indicate as the judgment of the foremost street-railway men in the country that a certain model of a street-car was the best that had been presented during the year, with reference to its practicablility, to the arrangements for heating, lighting and ventilation, and to other important questions. Similarly other features of street-railway improvement could be considered and a powerful stimulus offered to the devising of practical betterments.

The constitution of the committees and the nature of the premiums—whether in the shape of money or of medals—are questions of secondary importance; but the main feature of the system has, to me at least, much to commend it. The American Street-Railway Association is aiming at the general improvement and economy of street-railway operation, and by this plan it would be able, at small expense and with little trouble, to institute a general spirit of improvement among street-railway operatives in every capacity.

To suggest a practical method of offering the premiums is perhaps not a provine of mine, but as an instance of the needs of street-railway operation of the present time I can refer to the premium list of the National Railway Exposition, held in Chicago, in 1883. The street-

railway interests were not forgotten and the following premiums were offered in this connection:

Best Iron Wheel	Silver Medal.
Best Combination Wheel	Silver Medal.
Best Rail	Silver Medal.
Best Rail-Joint	Silver Medal.
Best Car	Gold Medal.
Best Car-Spring	Silver Medal.
Best Draw-Spring	Bronze Medal.
Best Street-Car Gong	Bronze Medal.
Best Bell-Cord and Fixtures Complete	Bronze Medal.
Best Fare-Box	Silver Medal.
Best Center Lamp	Silver Medal.
Best End Lamp	Bronze Medal.
Best Hand-Rail Bracket	Bronze Medal.
Best Hand-Rail Socket	Bronze Medal.
Best Journal Bearing	Bronze Medal.
Best Door-Lock	Bronze Medal.
Best Window Fixtures	Bronze Medal.
Best Window-Blinds Complete	Bronze Medal.
Best Registering Punch	Bronze Medal.
Best Registering Device	Bronze Medal.
Best Track-Cleaner	Silver Medal.
Best Sheave for Sliding-Door	Bronze Medal.
Best Change-Gate	Bronze Medal.
Best Door-Hook and Plate	Bronze Medal.
Best Door-Handle	Bronze Medal.
Best Door-Roller	Bronze Medal.
Best Hame-Bell	Bronze Medal.

The adoption of this list, with proper modifications, would be a practical way of encouraging and fostering improvements, and the award of premiums by the American Street-Railway Association, the national authority on street-railway questions, would be of more pronounced benefit than the award by the exposition in question, great as was the interest taken in the latter. The subject is at least worthy of careful consideration.

TAXATION OF STREET-RAILWAY PROPERTY.

BY A. D. ROGERS.

[A Paper read before the Convention of the Ohio State Tramway Association.]

THIS is a practical question which concerns us all, and in view of the high rates of taxation in our cities, is of considerable importance. A few suggestions, of little value in themselves, perhaps, may elicit information and discussion, and thus be made profitable.

It is not expected, I presume, that this paper shall deal with the question *abstractly*, but rather with the methods under existing laws for ascertaining values of our property subject to taxation. No attempt has ever been made, so far as I know, to impose taxes for *general purposes* upon anything belonging to such corporations except their tangible property, and as to *assessments* for *special purposes*, I may say in passing, though perhaps foreign to my subject, that it is difficult to conceive of any principle under our laws authorizing their imposition upon such corporations except upon their real estate. Yet the claim has recently been advanced in the discussion of a project for widening a street in this city upon which a line of street-railroad is operated, that the company owning such line may, in addition to its real estate, be assessed for a portion of the cost of the improvement, but upon what—whether right of way in the street, considered as an easement, or upon the company's franchise, or what else, is matter for conjecture. The claim, however, is an absurdity, and is only mentioned to show the disposition sometimes manifested towards us.

Aside from our real estate, which, of course, is appraised as all other real estate, and without reference to its particular use, the chief items of taxation belonging to our companies are *Track*, *Horses* and *Cars*. Let us consider the matter of their valuation for taxation in the order named.

Track. I have no information either as to valuations in the different cities or the rules by which they have been made. They must vary considerably in cost in various localties and even as to different lines in the same city, according to the description and cost of materials, labor, etc. The question at once presents itself—how far should cost of construction govern the appraisement? Unquestionably a fair proportion of the value of the materials placed in the streets for the exclusive use of such companies should be included in the estimate, allowing, of course, for wear and decay.

In addition to such materials the *labor* on our structure and the *paving* required in connection therewith are the only items of expense. But the labor is largely expended in connection with the paving, and, therefore, as we view it, constitutes a small factor in the calculation. Paving is generally required of us as part of the consideration of our privileges in the streets. We maintain a portion of the street, but we use this portion only in common with the public. We can claim nothing except that which is peculiar to our business. In some cities companies are required by their contracts with city authorities to pay in money for their privileges and are relieved of all care of the streets. It certainly will not be claimed in such cases that paving should be embraced in such estimates. Yet this differs from the more common arrangement as stated, only in the method of rendering to the city the same equivalent. In making these estimates, then, there should be excluded from cost of construction all the expense except materials for our exclusive use and the labor necessary to place them in the street.

The public often have an exaggerated idea as to our profits, and this consideration sometimes seems to influence officials in passing upon our returns to increase valuations on that account; but this, even if such opinions are well-founded, is wholly unwarranted. In effect it would be the imposition of a tax upon our business, which is not admissible under our laws.

Horses. As to these we know they cost a great deal of money. We know also that they soon wear out. All that intelligent care can accomplish is done to prolong the period of their usefulness, but our records show clearly that their longevity for our purposes is limited to a very few years—less, probably, than one-fourth of that common in other employments. Large allowance should be made in all estimates of value for this constant shrinkage. The average value of all the horses in our respective counties as they are returned for taxation should afford some guide to us in making our returns. It will be conceded by every one familiar with the matter that a considerable discount should be made from this average if we are to pay only a fair share of taxes on this species of property.

Cars. Of these little need be said. They are peculiar to our business and outside of it are comparatively without value. Their first cost is large, yet by reason of great exposure they rapidly deteriorate. They should bear taxation on a very small proportion of their original cost,

Having thus particularized let me, in conclusion, say a word in this connection generally. The business of these corporations is of a public nature. They are the servants of the people, and all classes enjoy their benefits and contribute to their support. In view of this relation have we not a right to expect of public officials, as the agents of the people, hearty good will, and in their dealings with us the utmost fairness—even liberality? Happily for us, such, I think, has been the disposition generally manifested towards us. Let us hope that it may always prevail, and that the obligations we have assumed may thus be morally reinforced, resulting in the best possible service.

Third Annual Meeting of the Street-Railway Association of the State of New York.

THE third annual meeting of the Street-Railway Association of the State of New York was held at the United States Hotel, Saratoga Springs, N. Y., on Tuesday, September 1st. The association now numbers as members twenty-six street-railway companies of the state, nearly all of which were represented at the meeting, three new members joining. The membership of the association further represents three-fourths of the paid up capital stock of New York State companies, and the organization is in a flourishing condition.

The following papers were read in the form of reports of special committees: "Heating and Lighting," by C. Densmore Wyman (vice-president, Central Park, North and East River Railroad Company, New York); "Labor and Wages," by D. B. Hasbrouck (secretary and treasurer, Houston, West Street and Pavonia Ferry Railroad Company, New York); and "Rules for Railroad Employés," by D. F. Lewis (secretary and treasurer, Brooklyn City Railroad Company, Brooklyn).

The following officers of the association were elected for the ensuing year:

President, Henry M. Watson (president, Buffalo Street-Railroad Company, Buffalo); First Vice-President, C. Densmore Wyman (vice-president, Central Park, North and East River Railroad Company, New York); Second Vice-President, Chauncey C. Woodworth (secretary, Rochester City and Brighton Railroad Company, Rochester); Secretary and Treasurer, William J. Richardson (secretary, Atlantic Avenue Railroad Company, Brooklyn); Executive Committee, the president, secretary and treasurer, and Jacob Sharp (president, Twenty-third street Railway and Christopher and Tenth Street Railway Companies, New York); Lewis Lyon (president, Third Avenue Railroad Company, New York), and William H. Hays (president, Eighth and Ninth Avenue Railroad Companies, New York).

The fourth annual meeting of the association will be held in New York City, on Tuesday, September 21st, 1886.

The Approaching Fourth Annual Meeting of the American Street-Railway Association.

THE fourth annual meeting of the American Street-Railway Association will be held at the Southern Hotel, St. Louis, Mo., commencing on Wednesday, October 21st, at 10 A. M., and continuing in session for two and possibly three days. Preparations are completed for the accommodation and entertainment of those attending, and the street-railway companies of St. Louis are taking an active interest in combining with the executive committee of the association to insure a large and successful convention.

Reports will be submitted at the meeting by special committees on the following subjects: "Diseases Common to Car-Horses and their Treatment;" "Progress of the Cable System of Motive-Power;" "Progress of Electricity as a Motive-Power;" "Repairs of Tracks;" "Rules Governing Conductors and Drivers;" "Taxation and License," and "Ventilation, Lighting and Care of Cars."

A few days since a representative of the JOURNAL called upon Mr. William J. Richardson, the secretary of the association, at his office in Brooklyn, and was informed that the approaching convention would, in all probability, be the largest yet held. The membership of the association now numbers one hundred and twenty-four street-railway companies, having doubled during and since the last meeting. A further increase of membership by fifty or sixty companies is expected during the coming year. Nearly every State is represented in the membership and several Canadian street-railway companies are also enrolled.

Secretary Richardson further stated that he was in correspondence with the managers of the New York Central to arrange for a reduction of fare over its road and connecting lines, from all the principal cities between Boston and St. Louis, to all representatives of members of the association who intend being present at the meeting, and that as soon as these arrangements were completed he would send out a general notice of such reduction and the manner in which tickets can be secured.

The rates thus far obtained are as follows: Boston and Worcester, $25; Springfield, Mass, $24; New York, Albany and Schenectady, $20; Utica and Syracuse, $19; Rochester, $18.

As heretofore, invitations to attend the meeting have been sent to every street-railway company in the United States and Canada, and Mr. Richardson is laboring indefatigably to render the meeting one of marked success.

Fourth Annual Meeting of the Ohio State Tramway Association.

THE fourth annual meeting of the Ohio State Tramway Association will be held in Toledo, Ohio, on Wednesday, November 18th, under the auspices of the Metropolitan Railway Company of that city. Arrangements for the meeting are not definitely completed, but a good attendance is expected and a number of interesting reports and papers will be submitted and read. The subjects of these reports and papers have not yet been fully chosen.

The American Street-Railway Mutual Insurance Company.

NO meeting of the directors of the American Street-Railway Mutual Insurance Company was held during the summer months, but at the meeting on the 24th inst., matters of importance were considered. The next meeting of the directors will be held at the Southern Hotel, St. Louis, Mo., on Tuesday, October 20th, 1885, at 8 o'clock, P. M.

The Original Cable Road Patent.

MR. JOHN H. GOULD, of Philadelphia, Pa., whose combined railway track-support, etc., is described in the department of New Inventions this month, writes the JOURNAL that he was one of the patentees of the first patent granted for underground cable roads. He says:

"I beg to add that I am one of the patentees for improvement in tracks of city railways, now called cable railways, which was issued in March, 1858, (No. 19,736) the same under which the Cable Railway Company of San Francisco is now operating its several lines and exacting royalties from other traction companies, to which, in consequence of the priority of my patent, they have no right, as the subsequent patents are of no avail. Unfortunately through lack of enterprise on the part of railroad men in this city and by reason of my large interests in the furniture trade, this patent expired without having been put to use. Of course I could claim damages if I could prove the fact that any of these cable railways were operated prior to the expiration of my patent. In reference to patent No. 19,736, I would further state that this is the original patent for underground cable railroads."

The Daft Electric System.

A DAFT electric motor is now being experimentally run upon the New York elevated roads, and its operation thus far gives many indications of its future adoption. The Hampden Branch of the Union Passenger Railway Company, of Baltimore, Md., is now being successfully operated by the Daft system.

Repairing Pavements.

COMMISSIONER of Public Works Squire, of this city, has sent a letter to the various surface railway companies upon their duty to repair the pavements along their routes. The commissioner says that after the past severe winter, during which the street-pavements were, in addition to the ordinary wear and tear, subjected to the influence of many storms, extreme cold, and rapid changes of temperature, the various streets are in need of extensive repairs. It is the duty of the street-railway companies to maintain the pavements in and about their tracks, of which they have the almost exclusive use. The companies are called upon by Mr. Squire to do this work at once.

The St. Louis Cable Road.

CONSIDERABLE difficulty is being met with just now in the construction of the cable railway in St. Louis, Mo. In excavating for the conduit between Channing and Cardinal avenues an 18-inch water-pipe, extending pretty nearly the whole distance, has been encountered, a little to the north of what is to be the center line between the two tracks. This water main must be unearthed, disjointed, refitted and placed in position a few feet to the north of the old line to be out of the way of the cable. The connections with private residences and fire-plugs will have to be made, and pretty much the same process must be followed in making the necessary changes in gas mains and their vast network of feeders that reach out toward the curb-line on either side of the street.

Another obstacle that has lately been discovered is the faultily constructed cast iron chairs to hold the T-rails in position at the extreme ends of the yoke. The chairs are either too narrow to receive the rail, or the base of the rail has been rolled too wide to pass into the chair slot intended to hold it in place.

About a block of the tubing has been placed in the ditch made to receive it, but the job of inclosing it with concrete has not been commenced. This is probably owing to the fact that the rails can not be put in position with the placing of the tubing, as was originally intended, to expedite the completion of the track. Had none of these difficulties arisen, a construction-train would have been put upon the rails, with a steam apparatus for mixing the concrete even more rapidly than it could be used by a force of fifty men with shovels.

Steam-Motors Approved.

[COMMUNICATED.]

OFFICE OF THE CONCORD HORSE RAILROAD.

Editor American Railroad Journal:

DEAR SIR:—I noticed an article in your August number under the head of "Street Railway Notes," relating to the use of steam-motors on the Concord, (N. H.) Street-Railroad Company. The statement there made is not correct; on the contrary, the motors are very popular with our citizens. There were a few opposed to them on personal grounds and they applied to the legislature and also to the city government to have them pass a law stopping the motors, but failed in both cases, we getting a unanimous vote in both bodies to allow the motors to run.

Yours truly,

MOSES HUMPHREY, President.

CONCORD, N. H., September 9th, 1885.

STREET-RAILWAY NOTES.

THE Southern Boulevard Street-Railroad Company was incorporated recently. It is to operate a road in New York City along the boulevard from the iron bridges across the Harlem River on the line of Third avenue to Boston avenue. The length is three-and-one-half miles. The capital stock is $250,000.

THE board of management of the American Exposition, New Orleans, has sent out notifications to various electric railway companies of the intention of the management to have an electric railway upon the Exposition grounds, and inviting bids from the companies.

THE Manhattan Railway Company operating the elevated roads of New York City, carried over its lines from October 1st, 1884, to September 22d, 1885, both days inclusive, 100,975,356 passengers.

IN the department of New Inventions of this month's JOURNAL, are published descriptions of a combined track-support and traction-cable and electric-conductors conduits, and of a fare-box register.

THE Cable Commissioners have rendered a unanimous report in favor of cable railways in this city. The entire proposed system which they advocate embraces twenty-nine different routes.

THE City Council of Peducah, Ky., have authorized a street-car company to construct and operate lines on Broadway, Broad, Walnut and Trimble streets. Work is to begin immediately.

THE scheme to build a horse-railway in New Rochelle, N. Y., is receiving ample encouragement, and there is no doubt about the early construction of a line from the depot to the Sound.

THE Hudson County (N. J.) elevated cable road, running from the ferry at Hoboken up Union Hill, is expected to be put in operation early in October.

New Inventions.

Handlan's Locomotive Head-Light.

ALEXANDER H. HANDLAN, Jr., of St. Louis, Mo., is the inventor of an improved form of locomotive head-light which is herewith illustrated and described. The inventor furnishes a signal-chamber and also means for securing signal-plates or glasses in position, while the signal-chamber is placed within the rim of the lantern instead of in front of the rim, as is customary, thus obviating a change in the contour of the body of the lantern.

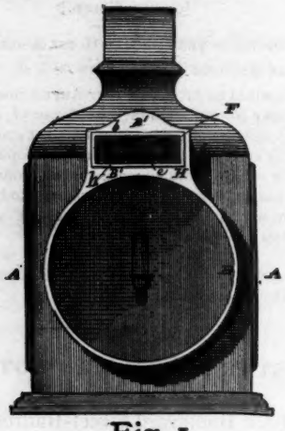

Fig. 1.

HANDLAN'S LOCOMOTIVE HEAD-LIGHT.

In the accompanying cuts, Fig. 1 is a front view of a head-light embodying the invention; Fig. 2 a side view thereof, a portion being removed; Fig. 3 a horizontal section of the signal-chamber on the line 3 3 in Fig. 1, and Fig. 4 a detail vertical section on the line 4 4 in Fig. 3.

A represents the body, C the reflector, and D the semaphore, of a head-light, which may be of any approved

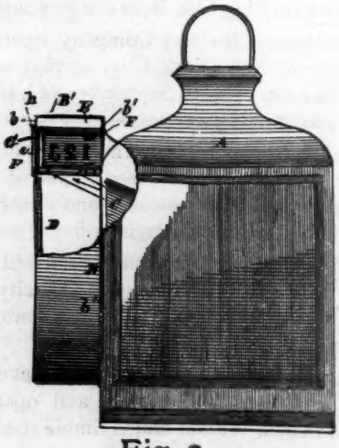

Fig. 2.

HANDLAN'S LOCOMOTIVE HEAD-LIGHT.

construction. B is the rim, having a top extension B', forming a signal-chamber E, in front of the body, open at the bottom. The rim is formed with a front plate b, a rear plate b', and a broad connecting-band b'', extending up and over the signal-chamber to obviate the necessity of cutting away the rim or body in the rear of the signal-chamber, thus forming the signal-chamber in one with the chamber in the rear of the semaphore. The signal-chamber E, is rectangular in horizontal section, and is solid on the rear side, while the front and sides have openings for the reception of the front signal e, and the side signals e' e'. Frames H, having flanges h, are placed in the openings, to receive the signal-plates, which are held in the frames by means of clamp-plates I, removably and ad-

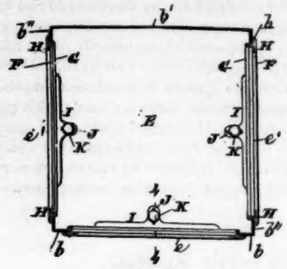

Fig. 3.

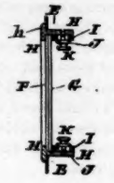

Fig. 4.

HANDLAN'S LOCOMOTIVE HEAD-LIGHT.

justably secured to the interior of the frames by set-screws K, passing through slots J, in the plates, and screwing into the frames, as shown more clearly in Figs. 3 and 4. As signal-plates it is preferable to use numbered glass plates F, and ground-glass plates G, behind them, and the outer glass should preferably be made black, except the lettered portion.

By this construction of rim signal-chamber, a flattened, broad signal-box is provided which can receive direct rays of light from the reflector being located within the rim, between the front and rear plates and contiguous to the reflector, without interfering with the ordinary circular semaphore, the signals being independent thereof, while at the same time they receive their light wholly through its chamber.

Though but recently patented, this head-light is claimed to be giving entire satisfaction, and it is stated that it is in use on one-third of the railway mileage of the country.

The device is now controlled and manufactured by M. M. Buck & Co., of St. Louis.

Clark's Rail-Support, or Tie.

JOHN K. CLARK, of Buffalo, N. Y., is the inventor of an improved rail-support, or tie for railways, which is herewith illustrated and described. The objects of the device are to avoid the use of wooden ties; to provide means for connecting metallic rail-supports, whereby is provided a solid bearing and a base for the ballast; a tie-plate and means for connecting two opposite metallic rail-supports; a continuous or unbroken bearing of the rail-supports and the connecting tie-plate on the road-bed, and to provide such construction and union of parts that a practically solid structure is secured, adapted to rest squarely and evenly on the road-bed and be properly confined in position by the ballast.

In the accompanying cuts, Fig. 1 is a perspective view of two of the rail-supports and connecting tie-plate, comprising the completed tie; Fig. 2 a detached perspective view of one of the rail-supports; Fig. 3 a detached perspective view of the tie-plate, and Fig. 4 a vertical sectional view of one of the rail-supports, showing a modification of the invention.

Each of the rail-supports is composed of a horizontal bottom wall or base number 1, vertical side walls 2, a transverse top plate 3, to which the rail is secured, and a central vertical web 4, journaled to the top plate and the bottom and side walls, the side walls being inclined from the end of the top plate to the ends of the bottom plate, whereby is provided a narrow top bearing-surface for the rail as compared to the extended base which rests on the road-bed. The bottom plate is formed with a rectangular

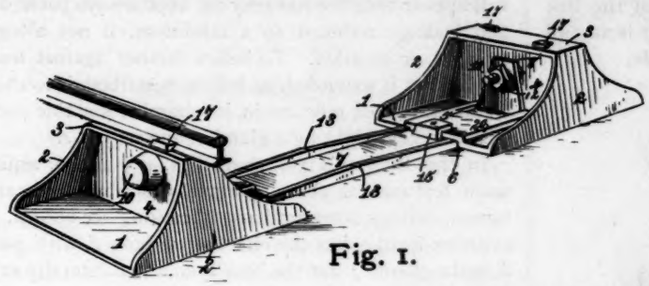

Fig. 1.

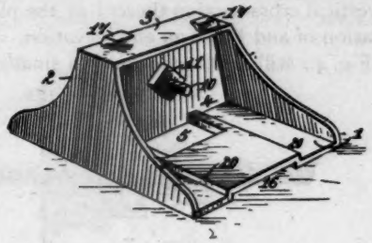

Fig. 2.

CLARK'S RAIL-SUPPORT, OR TIE.

slot or perforation 5, adjacent to the web 4, and the under side of the wall is formed with a rectilinear recess extending from the web to the end of the wall to constitute a depressed seat 6, for receiving one end of the tie-plate 7, so that when the latter is in the seat its lower surface may be flush with the lower surface of the support. The tie-plate is rectilinear in shape, and at each end is provided with a standard 8, formed as a flange, having a perforation 9, adjacent to its upper extremity, such standards passing through the perforations 5, in the bottom walls and engaging bolts 10, secured to the webs of the supports. These bolts are provided with heads and pass through the webs, to which they are attached at their inner end portions by screw-nuts 11, leaving the projecting threaded portion of the bolt to pass through the standards of the tie-plates and engage screw-nuts 12, which screw up against the standards to clamp them against the nuts 11. The tie-plates are ribbed longitudinally along their margins, as at 13, to provide strength, and are formed with two orifices 14, and raised lips 15, which project in opposite directions and respectively overlap the recessed ends of the bottom walls of the supports to hold such ends down and secure a strong and substantial connection of the parts. The object of the orifices is to permit the lips 15, to be formed by punching or molding up the metal, thereby forming the lips and creating the orifices.

The ends of the tie-plate, being seated in depressed seats in the bottom walls of the supports, prevent any lateral movement of the support in relation to the tie-plate, as well as bring the parts flush to preserve the continuity of the bearing of the structure on the road-bed, and also obtain a broad or extended and continuous bearing on the road-bed between the supports, the whole constituting a solid structure or tie from end to end. The ballast—such as broken stones, etc.—is packed into the supports and upon the tie-plate, and as the latter rests on the road-bed in line with the bases of the supports, a firm and substantial railway-tie is produced.

The manner of connecting the rails with the top plate may be through the medium of the diagonally-arranged overhanging lugs 17, forming part of the top plate, as shown in Figs. 1 and 2 of the drawings; or the rails may be connected with the top plates by hooked screw-bolts, as shown in Fig. 5. In this example the top plate will be provided with square or angular orifices, through which pass the square shanks of the hooks 18, the hooks engaging the flanges of the rails, and the shanks of the hooks having screw-threaded extremities engaging screw-nuts 19, under the top plates of the supports, so that by screwing up the nuts the hooks clamp the rail-flanges on the top plate, while the angular form of the hook-shanks and angular sockets in the top plate prevent the hooks from turning in any direction. The orifices for the bolts 10, and for the hooks 18, will be cored out during the process of casting the rail-supports to avoid the expense of drilling. The depressed seats in the bottom walls of the rail-supports are formed by raising the metal of the walls, as at 20, thus imparting a bridged or angular form to the walls, so that they are of uniform thickness and considerably strengthened.

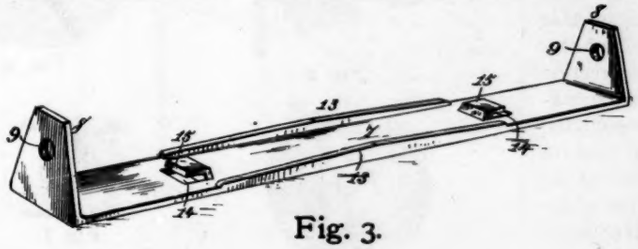

Fig. 3.

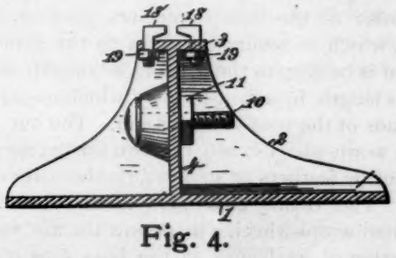

Fig. 4.

CLARK'S RAIL-SUPPORT, OR TIE.

Stitzel's Stuffing-Box.

FREDERICK STITZEL, of Louisville, Ky., is the inventor of an improved stuffing-box, which is herewith illustrated and described. The object of the invention is to provide means, readily accessible on the outside of stuffing-boxes, for tightening up the packing as it becomes loose, without

removing any of the parts; and it consists in a stuffing-box, the gland of which is made movable longitudinally to the piston-rod by a worm and worm-wheel mechanism to be operated from outside the box to compress the packing.

In the accompanying cuts, Fig. 1 is a vertical longitudinal section of the device; Fig. 2 a vertical cross-section in the plane of the line *x x*, Fig. 1; and Fig. 3 a bottom plan view with relation to Figs. 1 and 2. Fig. 4 is a vertical longitudinal section of another form of the device; Fig. 5 a vertical cross-section thereof in the plane of the line elevation of and Fig. 6 an end elevation. Fig. 7 is an end *y y*, Fig. 4; still another form, on a smaller scale.

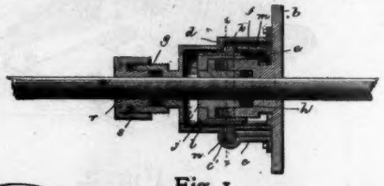

Fig. 1.

Fig. 2.

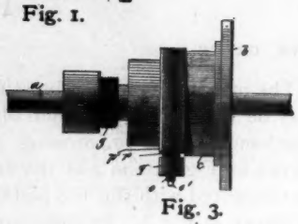

Fig. 3.

STITZEL'S STUFFING-BOX.

A portion of a piston-rod *a*, and the head *b*, of its cylinder are shown. To the head *b*, is bolted the bonnet *b*, which is shouldered at *d*, and within the space covered by this bonnet, the cylinder-head has an annular bead or lugs *e*, and also an exteriorly screw-threaded annular chambered boss *f*. The bonnet is also provided with a similar (preferably smaller) boss *g*, at its outer end. The chamber of the boss *f*, receives packing *h*, of suitable sort, which is retained therein by the gland *i*, and this gland is held up to the packing, adjustably in the direction of its length, by a flanged nut *j*, which engages the screw-threads of the boss *f*, to this end, The nut *j*, is encircled by a worm-wheel *k*, and the two are engaged to turn together by feathers or splines *l*, on the outer surface of the nut. This, or any equivalent mode of connection of the nut and worm-wheel, will permit the nut to travel in the direction of its length on the boss *f*, as it is rotated by the worm-wheel. The worm-wheel is a worm-toothed annulus, and it is held in place on one side by the bonnet, (as by its shoulder *d*,) and on the other by an annular band or equivalent support *m*, which in turn is held in place by the bead or lugs *e*, on the cylinder-head *b*. The worm-wheel is rotated by the worm *n*, on the shaft *o*, which is suitably supported in the bonnet and provided with facilities for rotating it outside of the bonnet. This worm-shaft, as shown, is stepped at one end in the foot of the tubular portion *c'*, of the bonnet *c*, and supported at its other end in a bushing *p*, tapped into the tubular portion *c'*, to close it air, gas, or steam-tight; and to insure further the tightness of this stoppering the bushing is provided with an annular flange *p'*, which fits over the mouth of the tubular portion *c'*, and which receives the screw-threaded cap *q*, between which and the end and flange of the bushing, packing may be interposed, as indicated in Fig. 2.

The worm-shaft *o*, has the end *o'*, projecting beyond the bushing and cap, and squared to receive a wrench, whereby it may be rotated, and it is obvious that rotating the worm-shaft in one direction turns the worm-wheel, and it the nut, and drives the nut toward the cylinder-head, and that the nut consequently forces the gland *i*, in the same direction, either by rotation or otherwise, and tightens up the packing, and all this is done without any removal of parts and consequent stoppage of machinery. Hence it will appear that the rod may be kept always packed tight and leakage reduced to a minimum, if not altogether stopped or avoided. To insure further against leakage, the bonnet is extended, as before described, into the boss *g*, and this boss receives in its chamber suitable packing, which is kept tight by a gland *r*, and its nut *s*.

In the stuffing-box shown Figs. 4, 5 and 6, while the main features of the previously-described box are retained, various structural modifications are shown. The cylinder-head *b*, has the chambered boss *f*, with packing *h*, and a gland *i*; but the boss is enlarged laterally at *f'*, to form the base of the bonnet *c*, and this bonnet is bolted to the enlargement leaving a rim *m'*, which takes the place and serves the purposes of the annular band *m*. The flange of the gland is extended laterally and perforated at diametrically opposite points, and through these perforations the screws *t t*, loosely pass. These screws are fixed against rotation in any suitable manner in the boss and bonnet, and are each provided with a nut *j'*, one end of each of which nuts bears against the flange of the gland. Each of these nuts is provided with a worm-wheel

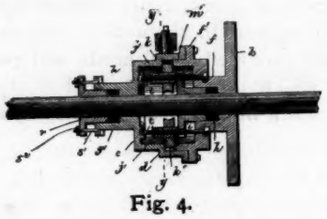

Fig. 4.

Fig. 5.

Fig. 6.

Fig. 7.

STITZEL'S STUFFING-BOX.

k, fitted thereon to turn it, this fitting being here shown as square. Each worm-wheel is engaged by a worm *n*, on the worm-shaft *o*, arranged substantially as in the former case. It is obvious that the rotation of the worm-shaft in one direction will so turn the worm-wheels and their engaged nuts *j' j'*, as to drive the nuts toward the cylinder-head, and hence force the gland in the same direction and so compress the packing *h*. The terminal boss *g'*, of the bonnet is chambered and provided with packing, but its gland *r*, is adjustably held therein by screw-hooks or bolts *s'*, engaging its flange, and secured by nuts s^2.

In Fig. 7 an arrangement is shown which is simply the doubling of the screws, nuts, worm-wheels, worms, and worm-shafts of the last above-described box. It is also

obvious that three independent sets of screws, worm-wheels, worms, worm-shafts, etc., may be used.

This mode of keeping the packing of rods tight is particularly advantageous in gas compressors for ice machinery, but it may also be applied to all kinds of machinery where it is important to keep tight joints to prevent leakage through stuffing-boxes.

The device is now controlled by the inventor and by Adolph Reutlinger and Moses Schwartz, of Louisville, Ky., to whom two-thirds of the patent-rights have been assigned.

Ellis' Railway Bumping-Post.

ELISHA W. ELLIS, of Lake, Ill., is the inventor of an improved railway bumping-post, which is herewith illustrated described. In the accompanying cuts, Fig. 1 is a side elevation of the device, and Fig. 2 a plan view.

A represents the sleepers or ties of a railway-track; E E the rails of a railway-track, and H the bumping-post, set in the ground and anchored there. F is a wooden

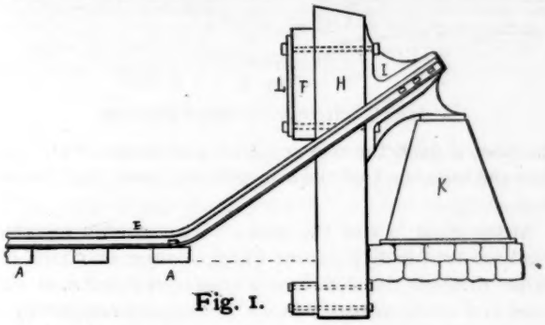

Fig. 1.

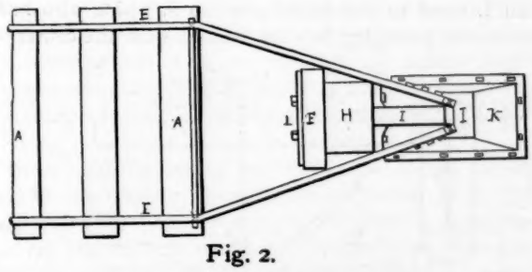

Fig. 2.

ELLIS' RAILWAY BUMPING-POST.

shield faced with iron L, bolted to the post, as shown, and adapted to receive the impact of a car-bumper. I is an iron casting or wooden projection secured to the rear of the post by the bolts which hold the shield F, thereto, and its rear end rests upon the top of a post or column K, set in the ground in the rear of the post H. The ends of the rails E E, are bent inward and upward, as shown in the cuts, and pass on each side of the post H, along the sides of the casting I, and are there secured together by one or more bolts, which pass through the two rails and the casting, as shown in the cuts. The effect is that the post is supported by the track which is held in position by its own weight and the weight of the car or cars upon it, and a very firm and unyielding structure is thus obtained.

This device is claimed to be strong and durable, efficient in its action, and not liable to derangement.

Sypher's Rotary Steam-Valve.

GEORGE W. SYPHER, of Seneca, Kans., is the inventor of an improved rotary steam-valve, which is herewith illustrated and described. It is the object of the inventor to provide a balanced rotary valve that can be readily adjusted to compensate for wear.

In the accompanying cuts, Fig. 1 is a longitudinal section of an engine-cylinder, and cross-section of a valve-case and valve of the improved construction applied thereto, and Fig. 2 a longitudinal section of the valve and case.

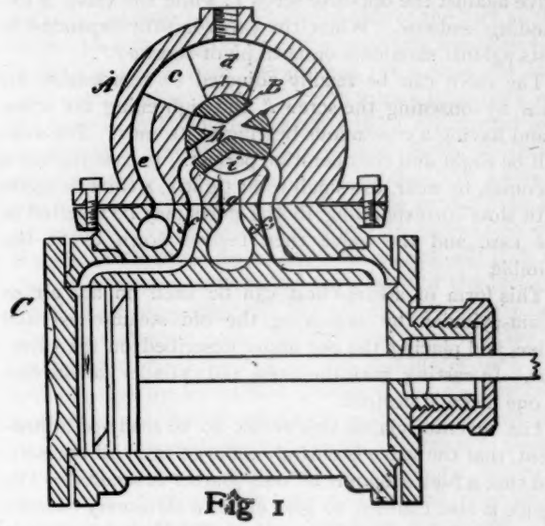

Fig 1

SYPHER'S ROTARY STEAM-VALVE.

A is the valve-case, attached upon the engine-cylinder C, and fitted with the rotary valve B. The valve-case is bored out centrally and longitudinally to receive the valve, and is provided with a removable head *b*, at one end, to allow insertion and removal of the valve. In the case above the valve, is a steam-space *c*; and a bridge *d*,

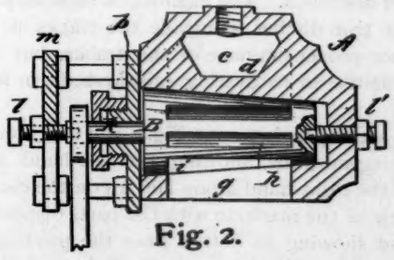

Fig. 2.

SYPHER'S ROTARY STEAM-VALVE.

at the middle of the steam-space, forms a bearing for the upper surface of the valve and a cut-off for the steam. *e* is a passage supplying steam to the space *c*. *f f'* are ports connecting from the valve to the steam-passages of the cylinder, and *g* is the exhaust-port.

The valve is of tapering or conical form, and is ground to its seat in the case. It is made with transverse slots *h*, extending the length of the ports *f f'*, and placed so as to connect these ports with the steam-space *c*. The valve is also made with an exhaust-cavity *i*, on its under side. A stem *k*, is formed or provided upon the large end of the valve, and this stem extends through the head *b*.

To relieve friction and allow endwise adjustment, the

valve is supported at its ends by the pivot-screws *l l'*, the ends of which enter recesses in the ends of the valve; and the screws are made with shoulders that take against the ends of the valve. The screw *l*, is sustained by a yoke *m*, the screw *l'*, being tapped through the end of the case. The screw-points and the surfaces of the case against which the valve presses should be made of hardened steel.

At the end of the stem *k*, on the large end of the valve and around the screw *l*, is a spiral spring which rests against the yoke and the end of the valve, to keep the valve against the opposite screw *l'*, while the valve is expanding endwise. When the valve is fully expanded it rests against shoulders on both pivot-screws *l l'*.

The valve can be readily adjusted to compensate for wear by loosening the screw *l'*, and tightening the screw *l*, and having a continuous bearing at its ends. The wear will be slight and the operation perfect. In case the valve becomes, by wear, too small to fit tightly, a thimble made with slots corresponding to the ports may be inserted in the case and the valve then turned down to fit the thimble.

This form of steam-chest can be used on any air or steam-cylinder by removing the old steam-chest and valve, and placing the one above described on the valve-seat. In casting, both the chest and cylinder can be cast in one piece, if desired.

The inventor claims this device to be ready of adjustment, that the valve is entirely relieved from all pressure, and that a fuel economy of one-quarter is secured. The device is also claimed to give either a stationary or locomotive-engine an increase of power with the same amount of pressure of either air or steam.

McGrew's Railway Ditching-Machine.

ALONZO H. MCGREW, of Hurley, Dakota, is the inventor of railway ditching-machine, which is herewith illustrated and described. The machine is especially adapted to open or trim ditches alongside the tracks of railways to facilitate proper drainage of the tracks, but it is also adapted for use in excavating railway-beds, or for other uses.

In the accompanying cuts, Fig. 1 is a side elevation of the ditching-machine, showing the left-hand scoop at work and the right-hand scoop laid up on the car; Fig. 2 a plan view of the machine with the parts disposed as in Fig. 1, and showing in dotted lines the position of the derrick when the ditching-scoop hangs vertically, nose downward, for discharging its load; Fig. 3 a side elevation showing the positions of the parts just prior to lifting the filled left-hand scoop from the ditch, and showing in dotted lines the scoop laid up on the car, and Fig. 4 a detail sectional plan view of one side portion of the car with the derrick in horizontal section.

A is the floor of a platform-car; B are the longitudinally-ranging side-sills of the car, and C the wheeled trucks of the car, which may have any suitable construction. At D, is shown a cross-beam which is fastened securely to and beneath the opposite sills B, of the car, and projects beyond them sufficiently at each side of the car to form bearings or supports for the lower pivots *e*, of the posts e^2, of the opposite derricks E, the upper pivots *e'*, of which, have their bearings in the ends of a cross-beam F, which is held directly over the lower cross-beam D, and is made fast to the top beams *g*, of the frames G, which beams *g*, are fixed to the posts *g'*, which rise from the sills B, of the car. Blocks *d d*, may be fastened to the sills B, and to the cross-beam D, near each end of the beam, to give it more substantial support. The post e^2, of each derrick E, is made with a central slot e^3, at the upper end of which, between the opposite side parts of

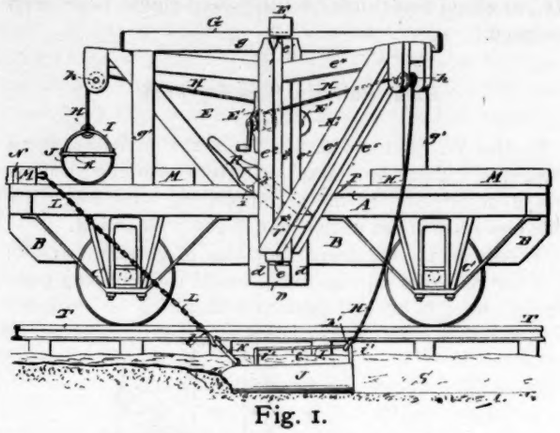

Fig. 1.

MC GREW'S RAILWAY-DITCHING MACHINE.

the post, is fixed the arm or gib e^4, and braces e^5 e^5, connect the outer end of the arm with the lower end of the post e^2.

At the inner face of the post e^2, is attached a suitable windlass or winch E', from which a rope or chain H, passes through the slot e^3, to a sheave or roller *h*, at the outer end of the arm e^4, whence it hangs to connect by a ring *h'*, with the longitudinally-ranging center-bar *i*, of a bail I, fixed to the ditching-scoop J, which also has a transversely-ranging forward bail K, with the center eye

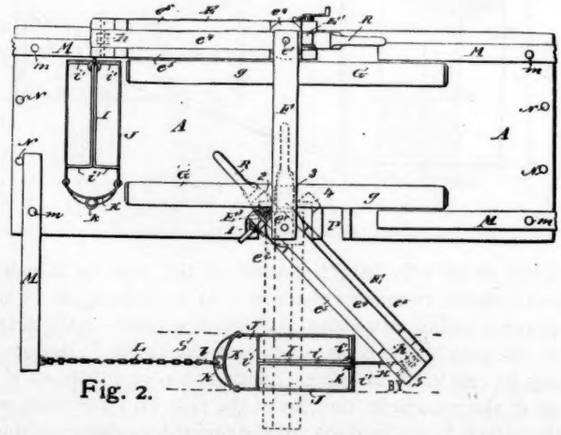

Fig. 2.

MC GREW'S RAILWAY DITCHING-MACHINE.

k, with which the hook *l*, on the end of a chain L, may be connected; and the other end of the chain L, is connected to the end of a stout arm or draft-beam M, which is pivoted at *m*, to the platform A; and a stop-pin N, is fixed in the platform so as to limit the swing of the beam M, and hold it about at a right angle with the side of the car when the scoop is at work. The scoop-bail I, is made of a couple of rods or bars, which have end parts *i'*, bent outwardly from their main center portions, which lie close

together and form the bar *i*, of the bail, the ends of the bars curving downward to connect with the side parts of the body of the scoop, as seen best in Fig. 2. At each side of the car-platform and around the posts e^2, of the opposite derricks E, is formed an opening O, which has a series of notches 1 2 3 4, made in the platform opening into it, as shown in Fig. 4, and at the side of the car-platform near the opening O, is formed an opening P, into which the brace-bars e^5, of the derricks are adapted to enter.

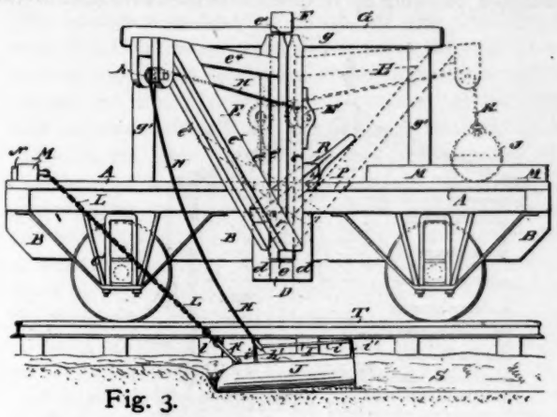

Fig. 3.

MC GREW'S RAILWAY DITCHING-MACHINE.

R is a lever which is pivoted at *r*, between the brace-bars e^5 e^5, of each derrick, and passes also between the side pieces of the derrick-posts e^2, and is adapted to be set into any one of the notches 1 2 3 4, the inner end of the lever being shaped as a handle by which the lever may be operated from the platform of the car to swing the derrick around. As shown in Figs. 1 and 2, draft-beams M, are provided at each side of both ends of the car to allow the draft-chains L, of two scoops J, one at each side of the car, to be connected with the opposite side beams M, at either end of the car, so that the scoops may be worked while the ditcher is running in either direction to cut or trim, or deepen ditches at both sides of the track T, at once, or at one side only, as desired.

To provide for laying up the scoops J J, one on each end of the ditcher, when out of use, and so as to distribute the weight of the scoops and derricks evenly over the car, the derricks are swung opposite ways toward the sides of the car. For instance, the right-hand derrick will be swung forward toward one end of the car, and the left-hand derrick will be swung rearward toward the opposite end of the car, so that the levers R, of the derricks may be locked into the notches 1, at opposite sides of the car, while the derrick-braces e^5, swing into the notches P, at the other sides of the openings O. This disposal of the derricks compels the notches 1 P, at opposite sides of the car to be reversed in position with relation to the opposite center notches, 3 3, as will readily be understood.

The operation of the machine is as follows: It is supposed that the ditcher is moving along the railway-track T, toward the left hand, and that a ditch S, is to be cut or opened at both sides of the track at once. The draft-bars M M, at the left-hand end of the car are swung outward, and their chains L, will support the front ends or noses of the scoops J, at about the right height when the derricks are held by their levers R, entered in the platform-notches 2, and the ropes or chains H, will be drawn upon by turning the windlasses E', of the derricks to give the scoops the desired pitch for regulating the depth of their cut. The ditcher will now be drawn or pushed forward until the scoops fill with earth, when the car will be stopped and the levers R, will be shifted from the notches 2, to the notches 4, which will swing the derricks from the position shown at the left-hand side of the car in Figs. 1 and 2, to the position shown in Fig. 3, the ropes H, being slackened a little to permit this movement; and as the derricks swing forward the ring *h'*, connecting the ropes H, with the bails I, will slide from the back ends of the bars *i*, of the bails I, to the forward ends of the bars, so that when the ropes H, are wound upon their windlasses E', to lift the scoops from the ditches, the scoops will hang nose upward to prevent the earth from falling back into the ditches, and when the earth is to be discharged from the scoops at the desired place or into chutes, which will carry the earth to one side of the ditches, the levers R, will be lifted from the notches 4, and be swung over and set again into the notches 2, which, in connection with the pull of the draft-chains L, on the scoops, will slide the rings *h*, of the ropes H, to the back ends of the bail-rods *i*, and the scoops then will hang from the chains L, and ropes H, with their noses inclined downward, to allow the earth to slide from the scoops; and should the earth stick to the scoops, the levers R, will be lifted from the notches 2, and will be set into the notches 3, as shown in dotted lines in Fig. 2, which will swing the derricks around to slacken the draft-chains L, sufficiently to allow the scoops to hang nose downward in about a vertical position, to insure the discharge of the earth from the scoops. The levers R, may now be set into the notches 2, and the empty scoops be lowered for another load, the car being drawn or pushed forward to continue the work, in the manner above described.

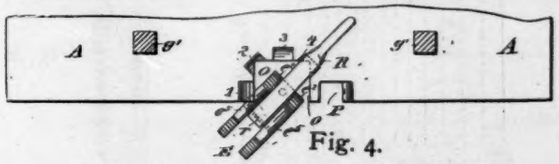

Fig. 4.

MC GREW'S RAILWAY DITCHING-MACHINE.

When the work is finished the ropes or chains H, will be slackened, and the derrick-levers R, will be set into the notches 4, the draft-chains L, will be unhooked from the scoops, and the windlasses will be operated to raise the scoops above the level of the car-platform, whereupon the levers R, will be set into the notches 1, which will carry the derrick-braces e^5, into their respective notches P, at the sides of the car, and lock the derricks against swinging outward, and at the same time swing the scoops one on each end of the car; and the pins N, being removed, the draft-beams and chains M L, will be swung inward on the pivots *m*, on the car, and the machine is ready for travel over the road.

In working the ditcher in the opposite direction, the draft-chains L, of the scoops will be connected to the beams M, at the other end of the car, and in loading and discharging the scoops, the levers R, will be set into the notches 2 3 4, in reverse order to that above described, as will readily be understood.

By extending the derrick-posts below the platform of

the car, the derricks may be made sufficiently large for the work without extending more than six feet, or thereabouts, above the car-floor, which prevents top-heaviness or instability of the car, allowing it to be run over the road with safety at a high rate of speed. It is evident that the ditching-machine may be constructed with a derrick and scoop at one side only for particular uses in special localities.

The machine is now entirely controlled by Messrs. Mathews & Scobey, of Brookings, Dakota, who are the sole agents for the United States and Canada.

Roberts' Railway Water-Tank.

ALBERT ROBERTS, of Marion, Iowa, is the inventor of an improved water-tank for railway service, which is herewith illustrated and described. The tank is especially designed to supply water to locomotives, and the object of the invention is to render the opening and closing of the outlet-valve more reliable, and to prevent the freezing up of the pipes and operative parts during cold weather. This tank is further designed to prevent injury to railway employés in operating it, which is a frequent occurrence with tanks that are operated by chains, pulleys, weights, etc., through the parts wearing out and falling upon the employés from overhead.

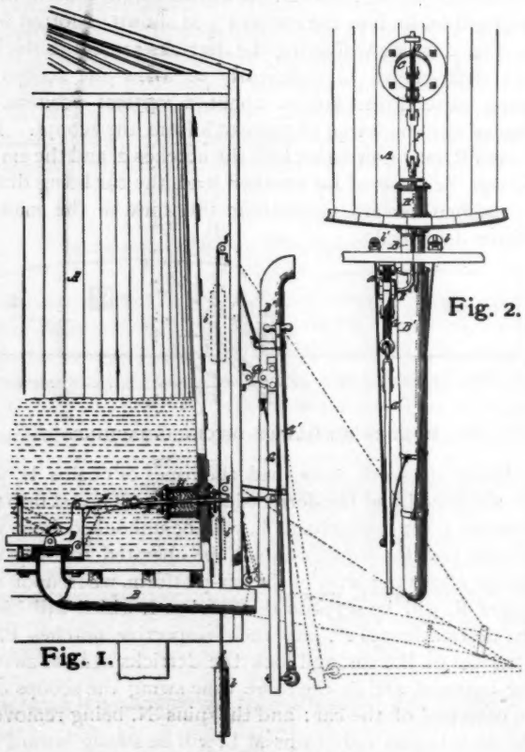

Fig. 1.

Fig. 2.

ROBERTS' RAILWAY WATER-TANK.

In the accompanying cuts, Fig. 1 is a vertical sectional view of the improved tank; Fig. 2 a plan view, and Fig. 3 a view showing the tank and its operation in supplying water to a locomotive.

The tank A, is not unlike those in ordinary use, the invention being applicable to any water-tank. In the bottom is fitted an escape-pipe B, turning outwardly, and adapted to connect with the swinging pipe B', in the usual manner. Over the opening in the bottom of the tank is a valve or gate C, adapted to lift on a lateral pivot by means of a bell-crank D, the valve being attached to the horizontal arm thereof. A rod E, connects with the vertical arm of the bell-crank by means of a suitable connecting-rod F, and passing through the side of the tank is moved back and forth by the pivoted lever G. To bring this lever within reach of the operator from the locomotive-tender, it is provided with a hinged bar G', adapted to swing up or down with the movement of the

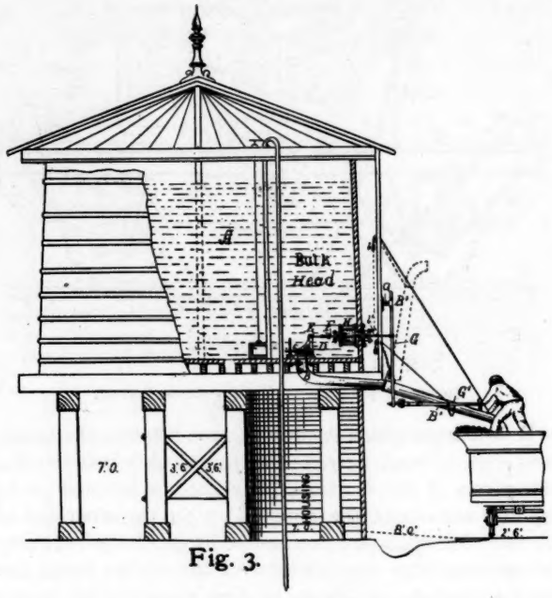

Fig. 3.

ROBERTS' RAILWAY WATER-TANK.

sway-spout B'. As will be seen, the lever G, is pivoted to an external timber of the tank above the valve-rod. A short connecting-rod *a*, permits the necessary variation in position as the valve is drawn out on a horizontal line. The lower end of the lever extends some distance below the outlet-pipe, so that when the sway-spout is lowered to the position indicated by the dotted lines it is about level with the end of the spout, and the handle-bar, pivoted to the lower end of the lever, is horizontal, rendering the operation of the lever and its connections easy and convenient. Another result is also secured by reason of the vertical difference between the pivotal points of the sway-spout and the handle-lever. The spout and the lever may be connected by a cord or chain, as shown. When the spout is elevated, the chain is drawn taut and the handle-lever is thereby held in a vertical position; but when lowered and in its normal position, the chain is slack, allowing the handle to be drawn outward, as indicated.

It will be seen that this construction admits of the valve being forcibly closed as well as opened. Ordinarily the valve is opened by means of a chain or cord passing over a pulley or pulleys at the top tank, and consequently the valve closes by gravity; but by reason of obstructions to the free movement of the chain, or otherwise, the valve is apt to close imperfectly and tardily, causing annoyance and loss of time. It is desirable, therefore, so to construct the apparatus that the operator may control the closing as well as the opening of the valve. To render the movement of the sway-spout and the handle-bar as

easy as possible, and to hold them at any desired angle, they may be provided with counterbalance-weights *b b'*, as represented.

One of the greatest difficulties met with in connection with the ordinary railway-tank is that occasioned by ice. Naturally the ice accumulates on the surface of the water and also around the sides of the tank. The cord or chain which raises the valve is thus continually exposed to the liability of being frozen fast and the tank rendered useless until temporarily relieved by cutting the ice away. This invention is designed to obviate this difficulty by passing the rod which actuates the valve through a non-freezing medium at that place which otherwise would be exposed to ice. To this end a chamber H, provided with suitable stuffing-boxes and glands, is attached to the inside of the tank near the bottom, and through this chamber or cylinder the valve-rod passes. The cylinder is made long enough to extend inward beyond the limits of frost, and, for better non-conduction, is preferably made of wood. In practice, this chamber is filled with common black oil, which will not congeal and serves to lubricate the valve-rod, and thereby the better prevent any accumulation of ice on the parts thereof extending beyond the stuffing-boxes. Obviously alcoholic spirits may be used instead of oil, but this is more expensive and not so good a lubricant. It may be possible, also, to dispense with every kind of a liquid medium here without any important modification of the device, the dead-air space in the chamber being a sufficient non-couductor. The chamber is quite simple in construction, and may be fully understood from the drawings without any further description.

The valve-rod being in the same vertical line with the outlet-pipe, provision must be made for the movement of the sway-spout and the lever at the side thereof connecting with the piston. This may be done by turning the outer end of the outlet-pipe to one side, or, what is equivalent, setting the valve-rod and chamber at an angle to the pipe; but in practice it is preferable to make an offset in the outer end of the valve-rod, as shown in Fig. 2, leaving all the parts and allowing for all the movements in parallel lines.

Gould's Combined Railway Track-Support and Traction-Cable and Electric-Conductors Conduits.

JOHN H. GOULD, of Philadelphia, Pa., is the inventor of a combined railway track-support and traction-cable and electric-conductors conduit, which is herewith illustrated and described. The invention is designed to provide a structure which will form a support or bed for railway and street-railway tracks, and also conduits for a traction-cable and for electric-conductors, respectively, and it consists of two parallel tubes united by cross-pieces, one of these tubes being slotted longitudinally and forming a conduit for a traction-cable, the other tube having a man-hole in its outer side and forming a conduit for electric-conductors, the two tubes together forming the support for rails fastened thereto or formed intregal therewith.

In the accompanying cuts, Fig. 1 is a vertical section of the device; Fig. 2 a side elevation, and Fig. 3 a plan view.

A and B represent, respectively, two tubes of metal which are held parallel and infixed relation to each other by cross-pieces C C. These cross-pieces may be bolted or otherwise fastened to the tubes, or be formed integral therewith. The tube A, is slotted longitudinally on its upper side, as shown at *a*, for the passage of a gripping-lever to engage with a traction-cable running on pulleys *a'*, in the tube. The tube B, has a man-hole *b*, in its outer side to permit access to the conductors therein, and the tube may be divided horizontally into compartments *b'*

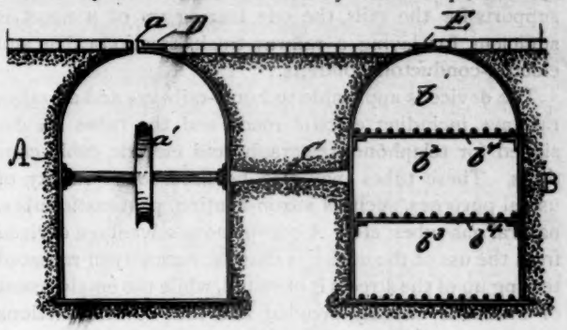

Fig. 1.

GOULD'S COMBINED RAILWAY TRACK-SUPPORT AND TRACTION-CABLE AND ELECTRIC-CONDUCTORS CONDUITS.

b² b³, by means of shelves *b⁴*, for the reception and separation of different classes of electric-conductors—viz., telephone, telegraph, and electric-light wires. The man-hole *b*, will be large enough to afford access through it to the several compartments in the tube B.

D and E represent railway-rails, which may be formed integral with the tubes A B, or be fastened thereto. The

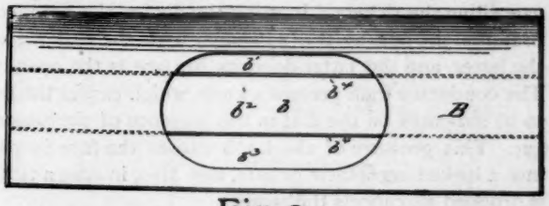

Fig. 2.

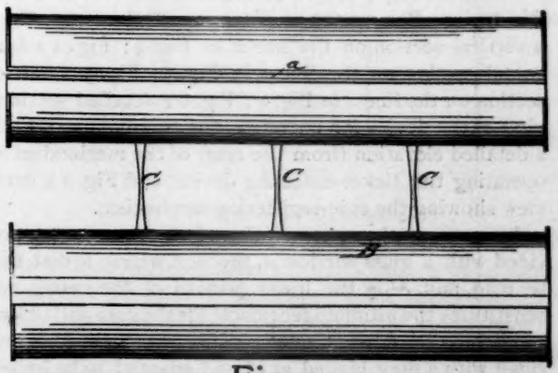

Fig. 3.

GOULD'S COMBINED RAILWAY TRACK-SUPPORT AND TRACTION-CABLE AND ELECTRIC-CONDUCTORS CONDUITS,

rail D is arranged in such relation to the slot *a*, that the tread of the car-wheel running on the rail will cover the slot.

In laying the structure which constitutes the invention, the ground will be excavated in two parallel channels to receive the conduits, leaving a ridge between on which the cross-pieces C C, will rest. The tubes A B, which are

formed in sections of suitable or convenient length, are then laid in the excavation and the sections fastened end to end, or jointed together in any suitable manner, as by bolting. The earth is then filled in over the cross-pieces and around the tubes and the paving laid, the tops of the tubes being on a level with the paving. As the tubes are fastened together by the cross-pieces they will not spread apart, and as these tubes form conduits and the supports for the rails, the one tearing up of a street is sufficient for laying a railway-track, traction-cable, and electric-conductors conduits.

The device is applicable to horse-railways and all other railways, including electric roads, and the tubes are designed for telephone, telegraph, and electric cable conduits. These tubes may also be used for a variety of useful purposes, such as steam-heating, pneumatic tubes, natural gas tubes, etc. A conspicuous advantage derived from the use of the device is that the necessity of repeated tearing up of the streets is obviated, while the employment of timber is entirely avoided, and that several sections may be placed in position without interfering in any way with the operation of the railway. The device is strong and durable, and can be put in position at moderate cost.

Mattoon's Fare-Box Register.

FRANK F. MATTOON, of Boston, Mass., is the inventor of a fare-box register for use on street-cars, and for similar uses, which is herewith illustrated and described. The device is intended to receive fares, whether in money or tickets, registering and indicating their reception, and cancelling the tickets. In using the device, the conductor presents the box to the passenger with the dial toward the latter, and the latter deposits his fare in the opening. The conductor then presses a knob, which causes the fare to be indicated on the dial in the presence of the passenger. This pressure of the knob causes the fare to pass into a locked receptacle or safe, and also, in case a ticket is dropped in, cancels the same.

In the accompanying cuts, Fig. 1 is a front elevation of the device; Fig. 2 a top or plan view of the same; Fig. 3 a vertical section on the line *x* in Fig. 4; Fig. 4 a horizontal section on the line *y* in Fig. 5; Fig. 5 a vertical section on the line *z* in Fig. 4; Fig. 6 a detailed sectional view of the device for operating the coin-damper; Fig. 7 a detailed elevation (from the rear) of the mechanism for operating the ticket-canceling device, and Fig. 8 a detail view showing the coin-registering mechanism.

A represents the upper portion of the outer casing provided with a glass window *a*, through which a dial may be read, and A′ is the lower portion of the casing, and constitutes the ultimate receptacle for the coin and tickets comprising the fares received. This receptacle A′, is provided with a door hinged at *a′*, and adapted to be locked by the person in charge of the conductors, and with a suitable handle A″, by means of which it may be carried about or attached to the person or clothing of the conductor.

B is an inner box locked internally at B′, to the floor A‴, in the casing, so that the mechanism, which is contained in this box, cannot be reached save by first unlocking the receptacle A′, and then the lock B′. This box B, is provided with the longitudinal vertical partitions *b b′*, the latter forming a chamber for the indicating mechanism, the transverse partition *c*, forming a part of the ticket-tube C, and the transverse partition *d*, forming a part of the coin-tube D.

Fares, in the shape of tickets, are dropped into the opening C′, leading to the tube C, and fall upon the damper or valve E, pivoted at E′, to the horizontal partition B″. In its normal position the damper E, is closed, as in Fig. 5, and it is of sufficient length to allow a ticket to lie flat upon it. On the same shaft with the damper is fixed the pinion *e*, which meshes in a rack *f*, carried by an arm *f′*, extending from the vertical rack *g*, rigidly secured to the vertically-moving push-rod F, provided with the cap or knob F′. The push-rod F, is held up in its normal position by the spiral spring *h*, which lies between the pin *h′*, and the depressed floor *h″*. The rack *g*, meshes in the pinion *g′*, which is loose on the shaft G, and rigidly secured to the same shaft are the disk-wheel G″, and gear or canceling wheel G′. A pawl *i*, pivoted to the wheel G″, lies in the pinion *g′*, preventing it from turning but in one direction, and a similar pawl *j*, is held by a spring *j′*, against the wheel G. A gear or cancelling wheel H, is loosely supported in the tube C, opposite to and meshing into the wheel G′. When a ticket has been dropped into the opening C′, and has fallen upon the damper E, as above mentioned, it is the duty of the conductor to press down the push-rod F. This carries down with it the rack *f*, turning the pinion *e*, and the damper E, (which is on the same shaft) into the position shown in broken lines in Fig. 5. The ticket is thus dropped into the tube C, between the approaching sides to the cancel-

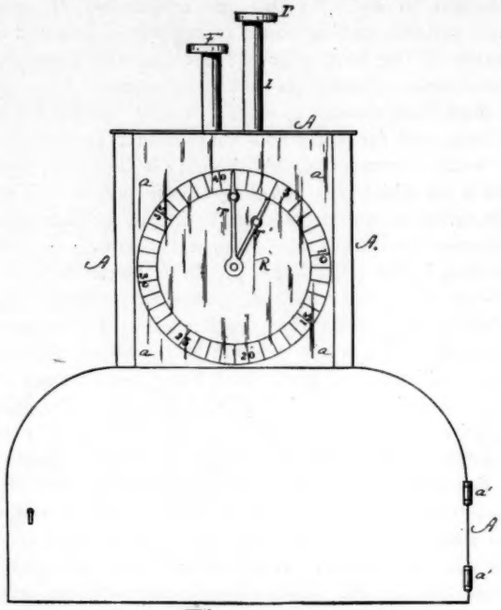

Fig. 1.

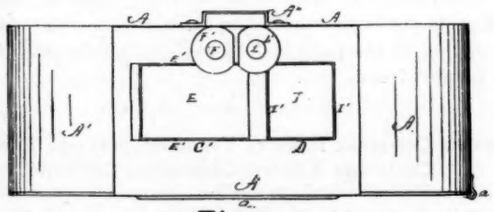

Fig. 2.

MATTOON'S FARE-BOX REGISTER.

ling-wheels H G′, which have not moved during the above operation, as the pinion *g′*, has turned loosely on its shaft, allowing the pawl *i*, to slip over its teeth. As pressure is removed from the push-rod F, and it is forced up by the spring *h*, the rack *g*, rising, turns the pinion *g′*, and by means of the pawl *i*, wheel G″ and shaft G, the cancelling-wheels G′ H, drawing down the ticket between them and cancelling it by means of the teeth. Thus it will be seen that pressing the push-rod drops the ticket into the con-

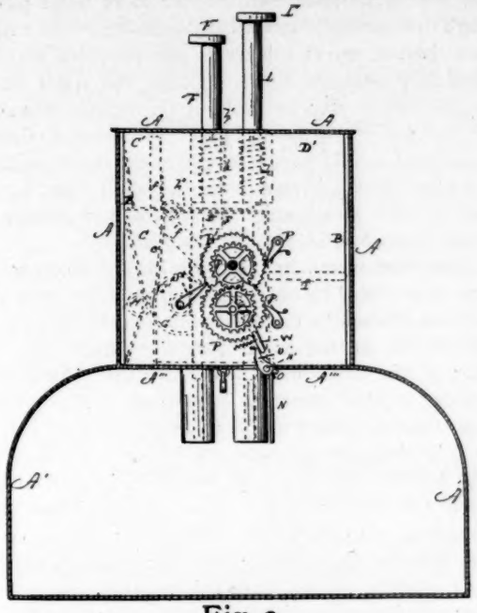

Fig. 3.

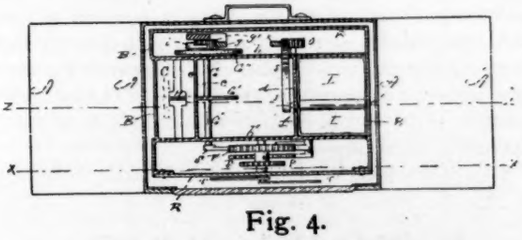

Fig. 4.

MATTOON'S FARE-BOX REGISTER.

ducting-tube C, and releasing it cancels the tickets and drops it into the safe or receptacle A′. Fares in the shape of coin are dropped into the opening D′, leading to the tube D, and fall upon the damper or valve I, pivoted at I′, to the partition *d*, and the box B.

In its normal position the damper I, is closed. A toothed segment *b*, is rigidly secured to the same shaft with the damper I, and engages with a rack K, extending downward from the push-rod L, surmounted with a knob L′. This push-rod is provided with a spring *l*, and pin *l′*, in similar manner to the push-rod F. A lower damper N, is hinged at N′, to the side of the tube D, and on its shaft is fixed a pinion O, which engages with the rack K, in such a position that while the damper I, is closed, the damper N, is open. When the coin has been dropped into the opening D′, upon the damper I, it is the duty of the conductor to press down the push-rod L, which, by means of the rack K, and segment J, opens the damper I, and at the same time, by means of the rack K, and pinion O, closes the damper N, and the coin drops upon it. When the push-rod L, is released, it springs up again and opens the damper N, and closes the damper I, dropping the coin into the receptacle A′.

A suitable registering mechanism P, is provided, and a dial R, connected therewith and showing through the glass *a*, whereby each fare is recorded and indicated on the dial. When a ticket-fare is deposited, a lever S, rigidly secured to the shaft G, moves the main wheel P′, of the registering mechanism one notch, and registers one on the dial by the hand T, moving one space. When a coin-fare is deposited, a lever U, rigidly secured to the shaft N′, moves the lever W, which moves the wheel P′,

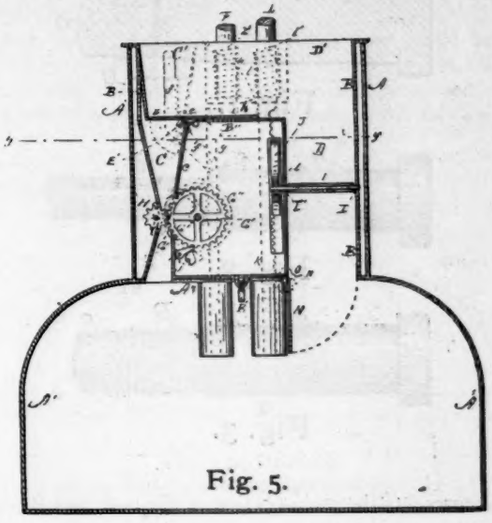

Fig. 5.

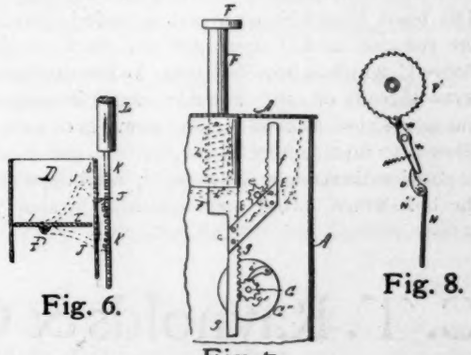

Fig. 6.

Fig. 7.

Fig. 8.

MATTOON'S FARE-BOX REGISTER.

one notch with similar results. As shown in the cuts, the hand T, is arranged to make a revolution, recording forty fares, while the hand T′, moves one space, thus giving the device a capacity of registering sixteen hundred fares.

It will be seen that even if the conductor should obtain entrance into the safe A′, the indicator would tell the tale of the fares, while if too much coin should accidentally be dropped in, the indicator would be his protection.

Morton's Nut-Lock.

JAMES W. MORTON, of Orange Court House, Va., has recently invented a nut-lock which is herewith illustrated and described. It consists of a thread or its equivalent with which the thread of the nut engages, so arranged as to support the nut when the latter is in position, this

thread being capable of revolving freely upon the bolt to which it is attached, carrying the nut with it, and also capable of being prevented from turning when desired, in order that the nut may be turned independent thereof to change their relative positions.

In the accompanying cuts, Fig. 1 is a central longitudinal section of the device as it appears in its normal position; Fig. 2 a detail view of the blank used to form the peculiar form of bolt necessary, and Fig. 3 a detail of the bolt in its completed form, showing the movable thread in position.

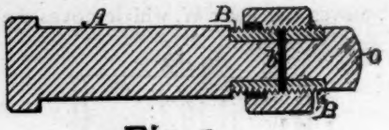

Fig. 1.

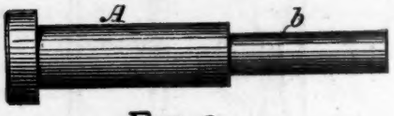

Fig. 2.

Fig. 3.

MORTON'S NUT-LOCK.

A represents the main portion of the bolt, and B represents the movable sleeve upon which the nut is placed. The blank from which the nut is made is provided with the reduced neck *b*, and upon this neck is placed the sleeve C, which is provided upon its interior surface with screw-threads or other suitable means for retaining the nut in position, as shown. The sleeve is of a diameter to allow it to revolve freely upon the bolt, and it is retained in position thereon by a button *c*, placed upon the end of the bolt, which button may be formed by simply "heading up" the bolt, or may be an independent piece placed upon the bolt and secured by riveting, a screw-thread, or the like. To get the best results in the operation of the device, the space between the interior of the sleeve and the reduced neck of the bolt is supplied with a lubricant, to insure its ready turning when force is exerted tending to produce that result.

In order that the sleeve may be held stationary when it is desired to turn the bolt independent thereof, the neck of the bolt is provided with one or more holes passing through from points diametrically opposite in the circumference thereof, and the sleeve is also provided with correspondingly-arranged holes, so that the holes in the neck and sleeve may be brought to register with each other, and a pin inserted to render the sleeve stationary. The pin used should be of a length to extend through the bolt and a short distance into the shell carrying the thread, but not long enough to project and impede the progress of the nut when being screwed on.

A convenient means limiting the inward movement of the nut is provided by making that part of the bolt adjacent to the sleeve of a diameter slightly greater than that of the sleeve, so that as soon as the thread upon the interior of the nut comes in contact with the bolt its movement in that direction is checked. It frequently happens that by reason of the wear of the parts or other cause it is desirable to screw the nut to bring it further inward toward the object to which it is applied, and therefore the rear part of the nut is formed with an opening adapting it to receive the contiguous portion of the bolt, so that the nut is capable of being carried inwardly a distance equal to the length of this opening.

From the foregoing it will be apparent that when the nut is screwed into its proper position upon the sleeve, and the pin which holds the sleeve in position to receive it is removed, any jarring of the bolt will turn the sleeve, carrying the nut with it, and the latter will not receive any motion independent of the sleeve. Consequently the position of the nut in relation to the body to which it is applied is not changed.

This device is claimed to be simple, durable and efficient.

GENERAL OFFICES THE ROTE AUTOMATIC BRAKE COMPANY,

MANSFIELD, OHIO, *November 3d, 1884.*

To the Westinghouse Air Brake Company, Pittsburgh, Pa.:

GENTLEMEN:—Understanding from your published announcements that you recommend your brake for freight-train use we respectfully invite you to a complete and searching public test of its merits in competition with the *Rote Automatic Brake.* This test to be made in so complete and critical a manner as to show all the railroads of the country, as well as the Railroad Commissioners of the various States, which of the two brakes is the one which should be used; for the test will, we are certain, leave no doubt in the minds of any witnessing it.

To insure the proper management of the test we suggest that you choose one person, we another, and these two a third person, all three to be well known as capable and honorable rolling-stock experts, to conduct the test, their expenses to be jointly borne by you and by us.

An invitation to witness the test to be extended to the General Officers of Railroads and all State Railroad Commissioners, to the members of the National Car-Builders Association, and to the Railroad and daily press.

The test to be at such time and place as may be mutually agreed upon, but we suggest that the proper place would be on some road having high grades and sharp curves, so that both brakes may have as hard and complete a test as possible. As it is necessary to make the test searching and complete, and as all railroads wish to increase the length of their trains and only wait for a brake which will enable them to do so, we think each train should be made up of 50, 60 or 70 cars, as you may prefer or, if you think best, of even more cars.

Your company to supply your train and engines, we to supply ours.

The following points, among others, to be considered and reported upon:

Cost of equipping trains.

Simplicity.

Freedom from breakage.

Certainty of action.

Effectiveness.

Cost of maintaining.

"Flatting" of wheels.

Any other points submitted by you or by us in writing to be added to the above.

The brakes or trains are to be tested in every manner and under all conditions which practical railway service may suggest, including yard as well as line service.

Among others the following tests are to be applied to both trains:

1st.—Each train is to be (part of the time) run by engineers and crews who have never operated either brake and who are wholly unfamiliar with them.

2d.—The trains are (part of the time) to be partly made up (as nearly all freights are everywhere) of foreign cars, which have neither your nor our brake on, so that the cars having your break or ours on shall be widely and irregularly separated from each other.

3d.—The locomotives drawing your train and ours to be exchanged, from time to time, and draw each others trains.

4th.—Two locomotives equipped as so many freight engines and tenders are, with hand-brakes instead of steam or air brakes, are to be substituted for the two engines used in the test part of the time. Any brake which will not work properly if this is done, you will admit, can be of little practical value in actual service.

5th.—From time to time each train is to be stopped and foreign cars (not equipped with either your brake or ours) are to be run into it, at irregular intervals, just as actual service requires constantly.

6th.—In the making up of trains, etc., crews are to be exchanged at random, so that the test may fully illustrate the convenience of operating each kind of brake in actual ordinary service.

7th.—Frequent short runs, stops and quick starts are to be made.

8th.—A series of yard tests are to be made, showing the action, convenience, etc., of the two brakes.

We mention a few necessary tests only, and you and we, as well as the test committee, are to add any number of others, it being distinctly understood that if you decline any test proposed by us, or we decline any proposed by you, it shall be condered an explicit and positive admission of inferiority.

This rule must in every case be strictly observed, namely: *Both brakes must be tested in precisely the same manner,* so that there may not only be absolute fairness, but no room for suspicion even of anything else.

You have been in the brake field a long time, have profited justly and largely from the patronage of railroads, and we are sure will welcome this plan for allowing your patrons and the American public to judge for themselves which brake should come into universal use.

Having proper confidence in the merits of your brake we know you will gladly and promptly accept our proposition herein made, as you must feel that the test will be complete.

The railroad public is a very fair-minded, capable body, and will most thoroughly appreciate and fully recognize the equity and fairness of our offer to you, and, in common with business-like people everywhere, will naturally (and, we are sure you will admit, properly) consider it a virtual confession of inferiority and a public admission that the Westinghouse Brake is inferior to the Rote Brake and that it is unfitted for general freight service, should you decline or neglect to avail yourselves of the proposition we make you herein.

Permit us to add in closing that we wish to express to you our desire to have this communication received in the spirit in which it is sent, and to have it express to you our wish for a full, fair and searching test of the two articles in the relative merits of which the railroad interest is *primary* and that of the owners even secondary. Respectfully,

THE ROTE AUTOMATIC BRAKE COMPANY,

Per M. D. HARTER, Presiden